PUBLIC TREES FOR PUBLIC GOOD:

An Assessment of Urban Forestry Management and Practices in Los Angeles County

TreePeople
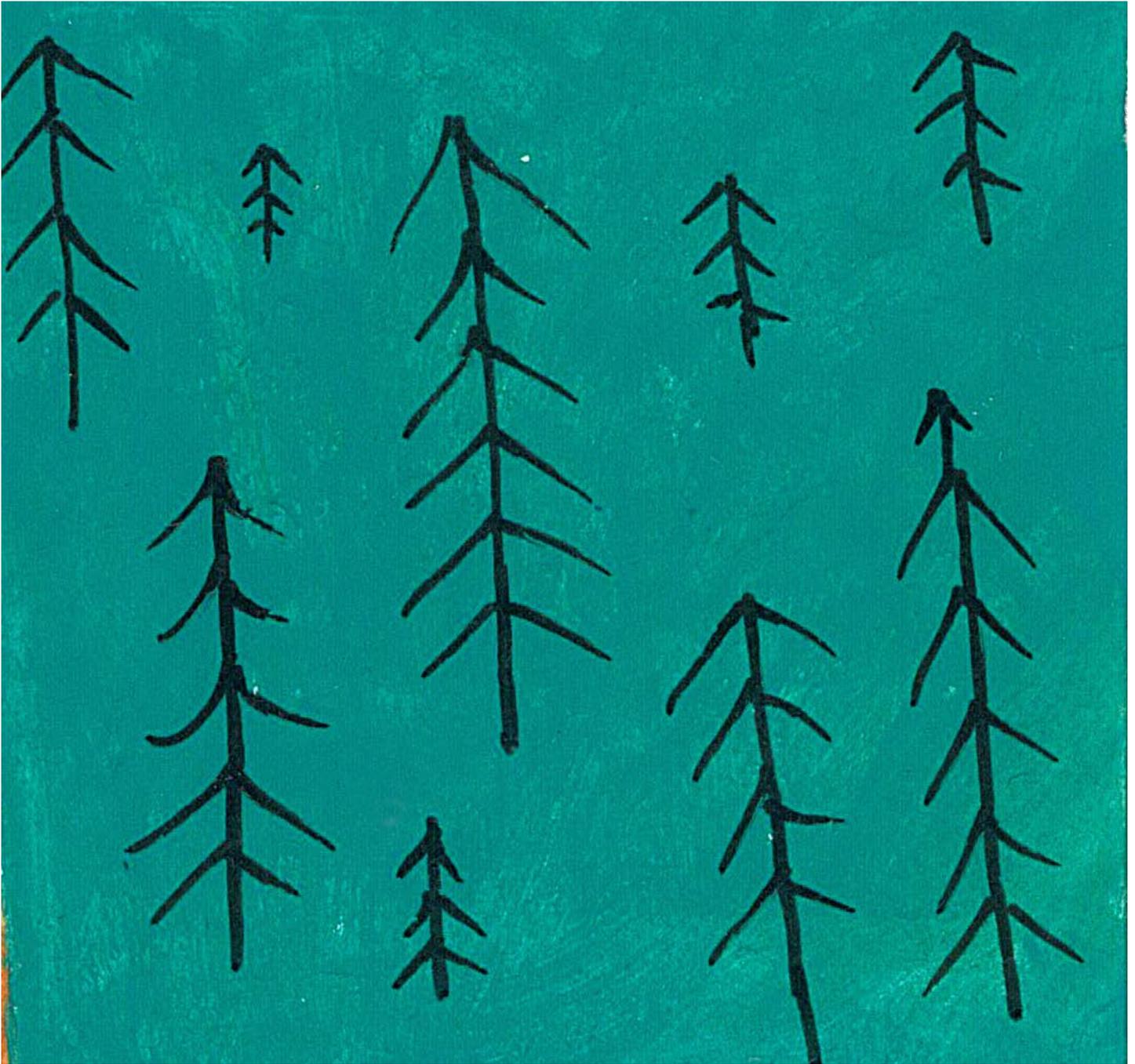
TreePeople

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TreePeople's mission is to inspire, engage and support people to take personal responsibility for the urban environment, making it safe, healthy, fun and sustainable and to share the process as a model for the world.

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An Assessment of Urban Forestry Management and Practices in Los Angeles County

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EXECUTIVE SUMMARY

This report summarizes the findings of an assessment of urban forestry in Los Angeles County that TreePeople was commissioned to conduct in 2017. With a special focus on the existence and public availability of street tree inventories and other urban forestry resources, the assessment combined an online survey with data from the open access database TreeMapLA to assess the status of urban forestry programs for a sample of 51 out of 88 municipalities of Los Angeles County. The assessment found that most cities in the sample have urban forestry programs and street tree inventories that are most often not made public, in part due to the high maintenance cost of online database platforms. Findings also indicated that funding is a major challenge for urban forestry programs. Several resources are presented that can help cities to implement robust urban forestry programs, but to be in a position to take advantage of these resources, cities need support to improve their organizational capacity.

Planting and maintaining an urban forest that exists in concert with other green infrastructure must include management by trained individuals and the use of tree inventories.

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INTRODUCTION

Cities around the world face dramatically intensifying extreme weather and climate impacts, including drought, long-term water shortages, flooding and extreme heat. In many instances, these impacts are already exceeding the designed capacity of city infrastructure to protect the health and safety of residents, businesses and neighborhoods, which in turn threatens the fiscal viability of cities and regions. Urban trees can play a significant role in making cities resilient to weather and climate extremes, and in protecting human and ecosystem health and safety. To do so, trees must be consciously selected, planted and managed as the central component of an *urban forest*[1] where individual trees are managed as part of a greater system with the purpose of improving the urban environment.

A robust urban forest may include other components of *green infrastructure*[2] tailored to meet local environmental and social needs, including flood attenuation, protection from extreme heat, air quality improvement, stress reduction, restoration of environmental justice and community economic development. In a broader green infrastructure context, trees are planted in combination with and connected to natural and manufactured components such as swales, rain gardens, cisterns and other stormwater retention and groundwater replenishment practices.

Yet the ability of urban trees and urban forests to achieve desired benefits is often drastically limited due to poor maintenance and management stemming from insufficient municipal budgets, lacking urban forest management systems and programs, limited training of tree care professionals and a lack of enforcement of tree-management best practices to support tree health. Consequently, improper pruning of trees is commonplace in many cities, resulting in limiting the beneficial functions of trees, leaving trees more susceptible to pests and disease, and leading to premature tree death. Urban trees face multiple challenges to surviving and thriving, resulting in a life expectancy of seven to 15 years according to the US Forest Service.[i] In urban environments, trees that die years prematurely will not create the root systems and canopies needed to reach their benefit potential and maximize their return on investment.

Planting and maintaining an urban forest that exists in concert with other green infrastructure must include *management by trained individuals* and the use of *tree inventories*. For trees to serve the maximum benefits and avoid costly negative impacts, they must be properly planted, cared for and managed by individuals with some level of training or knowledge – be they private individuals, gardeners,

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[1] The US Forest Service National Urban and Community Forestry Advisory Council describes urban forests as: "An urban ecosystem that is aesthetically pleasing, contributes to quality of life, supports community development and green infrastructure, and provides a wealth of benefits and values to cities and towns. Routine management is essential, and special care and practices are needed when trees are damaged following storms or other catastrophic events." (Ten-Year Urban Forestry Action Plan 2016-2026)

[2] Green infrastructure is "a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits. While single-purpose gray stormwater infrastructure—conventional piped drainage and water treatment systems—is designed to move urban stormwater away from the built environment, green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits." (EPA)

certified arborists, government employees or contractors. Likewise, maintaining a *tree inventory* can help ensure individual trees serve beneficial functions as part of the larger urban forest. A tree inventory is a database of trees that includes data such as species, location, size, health and maintenance history, and may also include a system for valuation of the tree's ecosystem or infrastructure services. Tree inventories can be created and maintained by city staff, tree care professionals, contractors, trained volunteers or a combination thereof. While tree inventories are essential to successful management of the urban forest, in practice the cost and complexity of maintaining an updated and functioning tree inventory means that many cities have ageing or partial inventories, or have no inventories at all.

The Los Angeles region faces many of these challenges and offers an opportunity to study, evaluate and plan for improving urban forest management toward the goal of supporting human and ecosystem health and well-being. The urgency of protecting the urban forest has risen sharply as drought, pests, disease, climate impacts and budget cuts lead to rapidly rising tree mortality. In the coastal Southern California region, which includes much of Los Angeles County, the US Forest Service estimates that 33.5 percent of trees are at risk of dying from just one pest: the polyphagous shot hole borer.[ii] In the greater Southern California area, that number rises to 38 percent, or 27 million trees, and the estimated cost of removing and replacing those trees is $36 billion.[iii] Threats to mortality extend beyond this one pest.

To address and reverse tree die-off and the loss of ecosystem benefits, each city in Los Angeles County needs a robust system of professional management and public access to support resident engagement in care and expansion of the urban forest. This technical report examines the current state of urban forest management in municipalities in Los Angeles County, including assessing the existence and status of tree inventories in each jurisdiction, and makes recommendations for how cities can start or advance their urban forest management programs.

ABOUT TREEPEOPLE

TreePeople is a Los Angeles-based environmental nonprofit organization founded in 1973. TreePeople works through grassroots community organizing and government collaboration to create a climate-ready Los Angeles with equitable tree canopy and a sustainable local water supply. Born from the efforts of a teenager over 40 years ago, TreePeople has involved more than 3 million people in planting and caring for more than 3 million trees.

PURPOSE OF THIS REPORT

The purpose of this report is to provide an accurate picture of urban forestry activities of a representative sample of municipalities and other public interest organizations in Los Angeles County. The report assesses municipal urban forestry programs, highlights existing urban forestry resources, with a special focus on those that are publicly available, and showcases best practices that could improve future urban forestry initiatives. Additionally, this report highlights challenges municipalities in Los Angeles County face in developing or sustaining urban forestry plans and activities. This includes program development, funding, staffing and other areas where creative solutions are needed. This report should be considered a resource to anyone wishing to improve urban forestry management in LA County.

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URBAN FORESTS: A BRIEF CONTEXT

Urban trees provide cities with multiple benefits and critical infrastructure services, including buffering from severe and extreme climate weather events,[3] carbon sequestration, air and water quality improvement, reduction of utility costs, stormwater runoff reduction, groundwater recharge, property value increase and crime reduction, among others.[iv] In the second half of the twentieth century, urban tree planting in the United States rose sharply as it emerged as an effective way to combat the deterioration of the quality of life of city environments caused by a rapid urbanization. As urban tree populations increased, the term *urban forest* began to be used by some city tree managers in the late 1960s and early 1970s. In recognition of the invaluable role of trees to the welfare of city residents, the US government passed the Cooperative Forest Management Act of 1972, which gave the USDA Forest Service the responsibility for fostering urban forestry.[v] The State of California followed with the California Urban Forestry Act of 1978, one of the most extensive urban forestry laws in the country.[vi] The Act recognizes trees as a vital resource to the urban environment and urges the Department of Forestry and Fire Prevention (CAL FIRE) to take appropriate measures to reverse the decline of urban trees, create permanent jobs in urban forestry activities and maximize citizen participation.[vii] An effort to augment and expand the Act was passed in 2017. California State Assembly Bill 1530 (Gonzalez-Fletcher) will bring changes including: make CAL FIRE's urban forestry permanent; require development of local and regional tree canopy targets with an emphasis on disadvantaged communities; expand scope of project funding to include urban forest care and maintenance; and provide up to 25% advance payment to nonprofit organizations located in or providing service to disadvantaged communities.

Since then, several campaigns have been carried out to promote and increase urban forests in California. In one of the earliest of such efforts, TreePeople mobilized Angelenos to plant one million urban trees as the City of Los Angeles was preparing to host the Olympic Summer Games in 1984.[viii] More recently, in 2005, then-mayor of Los Angeles Antonio Villaraigosa once again committed to plant a million trees, through the Million Trees Los Angeles campaign.[ix] This campaign later evolved into City Plants initiative, a private-public partnership between the City of Los Angeles, local nonprofit organizations, community groups, residents and businesses working to realize a greener city by planting trees, promoting green jobs and advocating for a sustainable City of Los Angeles.

A 2015 survey of 49 municipal street tree inventories across California's climate zones[4] by the USDA found that street trees make up 10 to 20 percent of all urban trees in California and provide $1 billion in annual benefits. Despite those benefits, tree planting has not kept pace with increasing urbanization. Absolute numbers of street trees increased from 5.9 million to 9.1 million between 1988 and 2014, but street tree density declined by 30 percent in the same period, due to a planting pace that is much slower than the rate of growth of cities and streets.[x] In addition, management capacity both among municipal and private entities is insufficient for such a critical resource. Various nationwide surveys of municipal urban forestry programs have identified gaps ranging from a lack of statistics on the number of urban trees or management plans,

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[3] Trees are able to moderate the effects of extreme weather events including intense heat, wind and rain. Although not explicitly weather buffering, trees also mitigate noise pollution.
[4] California's Sunset National Garden Book's 45 climate zones were aggregated into 6 "aggregated climate zones," for the purposes of i-Tree modeling (McPherson et al., 2016)
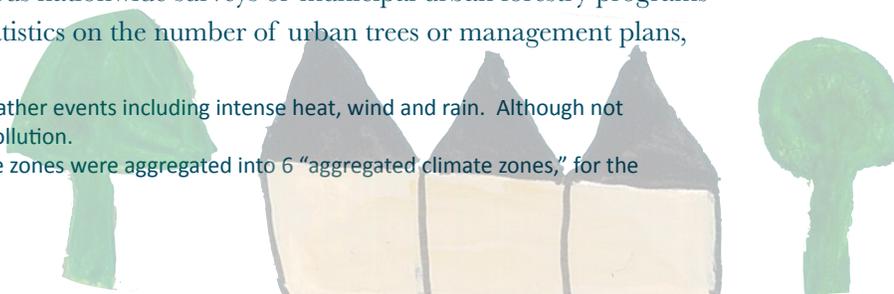
to inadequate budgets.[xi, xii] A forthcoming effort that will contribute significantly to understanding California's current conditions is the State of Urban and Community Forests in California survey and report, which has been conducted five times since 1988. The 2016 survey report will be published soon.

In an increasingly urban United States, the future success of municipal urban forestry programs in making cities more liveable and sustainable is dependent upon new methods of creative planning and management.[xiii] These methods include utilizing trees as a fundamental component of designed and engineered green infrastructure systems that better enable cities and their residents to become more resilient to multiple climate threats. New best practices and indicators for strategic urban forest planning and management have been identified, combining traditional variables such as canopy cover with new indicators such as approaches to forestry management.[xiv] If implemented, these new standards have the potential to maximize the benefits of urban trees for cities. There is also potential for urban forestry to be further incorporated into programs and regulations from the local to the international levels that are designed to improve environmental quality. State implementation plans of the Clean Air Act and international agreements such as the Kyoto Protocol and the Sustainable Development Goals (SDGs) are some of the examples of efforts where urban forestry can, and increasingly does, play a role.[xv, xvi]

For this potential to be realized, the benefits of trees and how those benefits change over time must be documented and quantified in order to determine if their impact is significant enough to warrant inclusion in such programs.[xvii] This evaluation requires routinely updated and comprehensive tree inventories, including complete data on the entire public tree resource, and a georeferenced canopy cover inventory based on aerial or satellite imagery. This distinction between tree inventory and canopy cover inventory allows for both micro and macro level tree resource management.[xviii]

The role and importance of urban forests in improving environmental quality will increase as urban areas expand,[xix] and tree planting will likely gain more momentum. However, as demonstrated by projects like Million Trees Los Angeles, ambitious planting initiatives often fail to take into account or overestimate cities' existing organizational capacity to properly plan, implement and provide adequate maintenance, leading such efforts to meet unexpected challenges in their implementation and long term success.[xx]

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METHODOLOGY

### SURVEY OF MUNICIPALITIES AND PUBLIC INTEREST ORGANIZATIONS

A questionnaire was sent to representatives within Los Angeles County, including municipal government representatives overseeing urban forest management and public interest organizations involved in urban forestry in at least some aspects of their work. Public interest organizations were defined as private and/or non-governmental organizations.

Jurisdictions within LA County include 88 cities plus unincorporated areas overseen by County government, for a total of 89 government entities; the survey was sent to all of them. The survey was also sent to 27 public interest organizations that were identified by the Los Angeles Stewardship Mapping and Assessment Project (STEW-MAP LA) as being involved in urban forestry activities. STEW-MAP LA is part of a USDA Forest Service national research program that seeks to inventory, characterize and geographically map the activities and relationships of environmental stewardship organizations in urban areas.[xxi] More details on STEW-MAP LA are in the section of this report titled "Other Efforts Relevant to Urban Forestry in Los Angeles County."

For municipalities, survey results were tabulated by three categories that have proven to have significant correlation to urban tree cover in previous nationwide studies: income, climate zone and population size.[xxii, xxiii] Public interest organizations were primarily categorized by the presence of a dedicated budget for urban greening.

INCOME

Urban Tree Cover (UTC) has been shown to have a strong positive correlation with household median income in major American cities, including Baltimore, Los Angeles, New York, Philadelphia, Raleigh, Sacramento and Washington, D.C.[xxiv] This correlation is also well established elsewhere around the country. Using income data from the *Los Angeles Times'* Mapping L.A. Project,[xxv] six brackets of median household income for LA County cities and unincorporated areas were created. Survey results were analyzed in these brackets to assess how urban forestry activities vary across income categories in the county.
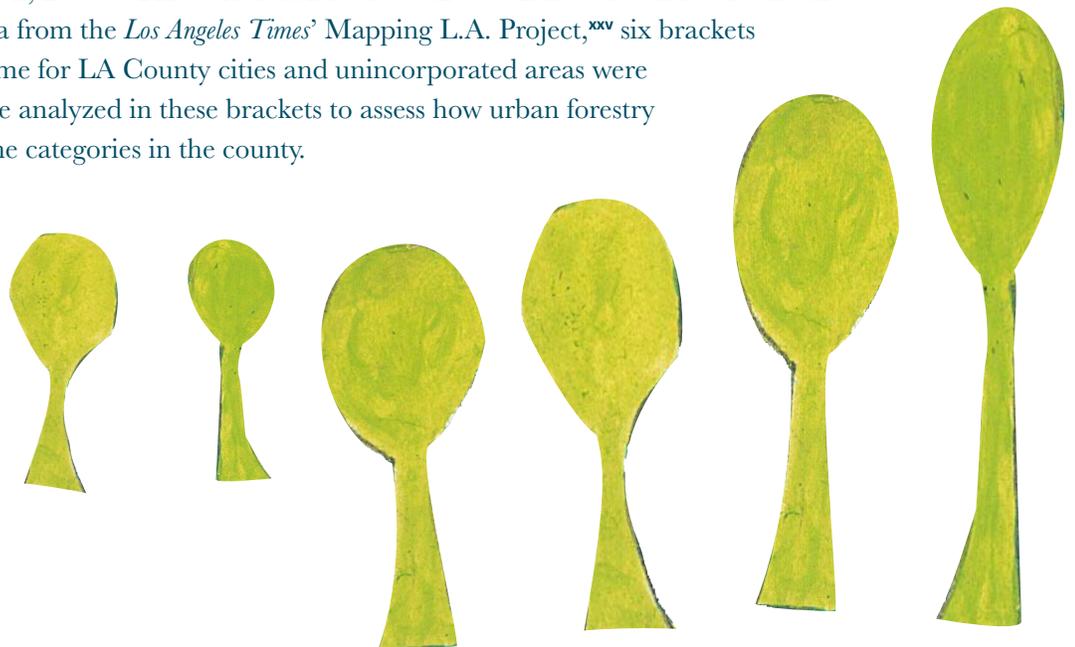
Due to its proximity to the ocean and a varied topography that includes multiple mountain ranges and basins, LA County has a wide variety of climate zones. They are shown in Figure 1 and listed below.

Figure 1: Map of Los Angeles County Sunset Climate Zones
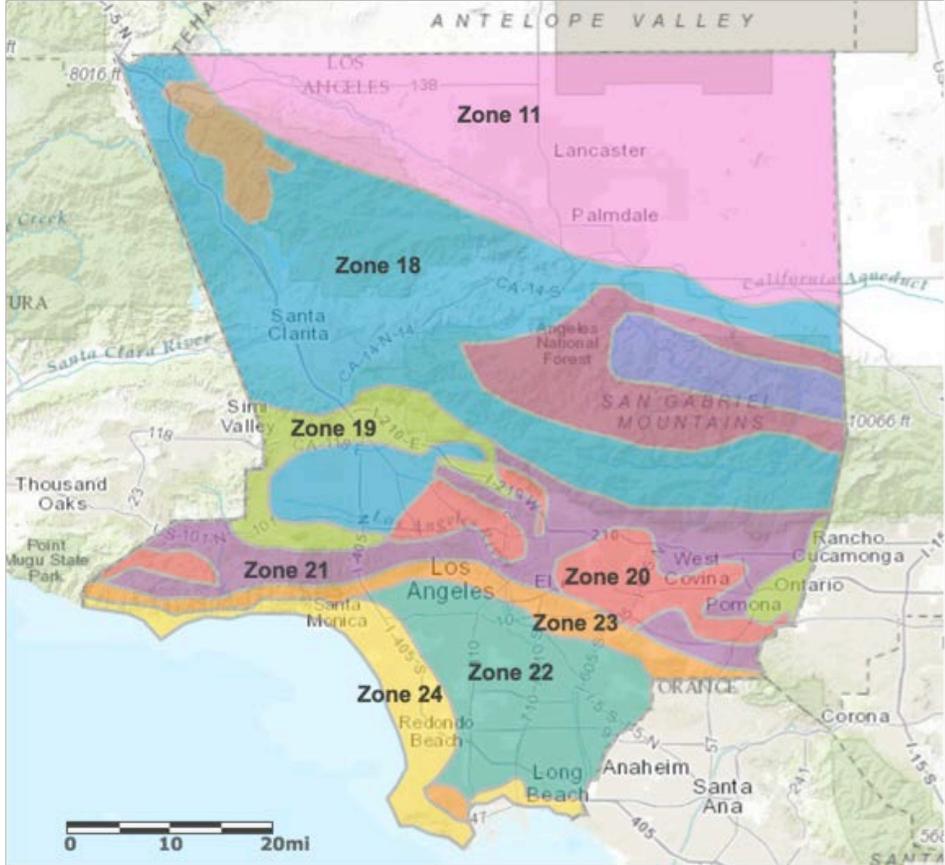
Credits: Esri, HERE, Garmin, FAO, USGS, EGA, EPA, NPS

Zone 11: Medium to high desert of California and southern Nevada
Zone 18: Above and below the thermal belts in Southern California's interior valleys
Zone 19: Thermal belts around Southern California's interior valleys
Zone 20: Cool winters in Southern California's areas of occasional ocean influence
Zone 21: Thermal belts in Southern California's areas of occasional ocean influence
Zone 22: Cold-winter portions of Southern California's coastal climate
Zone 23: Thermal belts of Southern California's coastal climate
Zone 24: Marine influence along the Southern California coast

McPherson et. al.'s benefits assessment of LA's urban trees suggests a variability of benefits across climate zones due to the trees' different growth curves in each climate.[xxvi] This difference of growth patterns may imply different management practices by municipalities. Tabulating results by climate zone allowed us to investigate potential variations in urban forestry activities by climate.

POPULATION SIZE

Surveys of urban forestry programs have found disparities across cities of different population sizes, with larger cities often having entire departments or agencies with professional staff solely dedicated to forestry programs, while smaller cities may be forced to merge such programs into other departments or use contractors for all urban forestry activities.[xxvii] This survey explores these patterns across cities of various sizes and with varying resources availability. The analysis includes a comparison of smaller-population, higher-income cities against smaller-population, but lower-income ones, and larger-population, higher-income cities against larger-population, lower-income ones.

SURVEY METHODS

The survey was designed to elicit each municipality's and public interest organization's urban forestry activities and to identify the potential, the challenges and the opportunities associated with implementation of those activities. The survey was distributed using the online Qualtrics survey software and where necessary, TreePeople followed up with phone calls to encourage respondents to take the survey or complete a survey that was incomplete.

EXISTING STREET TREES INVENTORIES

In addition to sending the survey to municipalities and organizations, the research team also compiled data from 33 municipalities that has previously submitted tree inventories for inclusion in TreeMapLA, a publicly accessible database. TreeMapLA is an online map using the OpenTreeMap platform. It was launched by TreePeople in 2014 to provide a web-based crowd-sourcing system for tree and green infrastructure stewardship and benefits quantification for Los Angeles County. It allows registered users to add information about LA's trees including tree location, height, diameter at breast height (DBH), date planted, species and planting site information. Environmental and economic benefits are calculated using those tree characteristics. TreeMapLA is discussed in detail in the section of this report titled "TreeMapLA: A Publicly Accessible Database."

OTHER EFFORTS RELEVANT TO URBAN FORESTRY IN LOS ANGELES COUNTY: STEW-MAP

The Stewardship Mapping and Assessment Project (STEW-MAP) is a nationwide research program by the USDA Forest Service designed to provide a catalog of environmental stewardship groups in urbanized landscapes. This program is relevant to the study in that it shines a light on organizations involved in environmental stewardship in cities, including those in LA County, thereby providing useful information for those seeking details on the current state of urban forestry and other environmental stewardship initiatives. STEW-MAP is described as both "an empirical study of a city's or region's civic environmental stewardship resources and a publicly available online database to help support environmental stewardship in these cities."[xxviii] This program was implemented in several major US cities including New York City, Baltimore, Chicago and Seattle. It is typically executed by partnerships that include agency scientists, nonprofit organizations and university researchers, guided by USDA protocols. STEW-MAP Los Angeles was launched in 2013 and is hosted by the Loyola Marymount University Center for Urban Resilience.[xxix]

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FINDINGS

RESPONDENT MUNICIPALITIES BY INCOME, CLIMATE ZONE AND POPULATION SIZE

Out of 88 municipalities of Los Angeles County, 25 cities plus LA County (overseeing the County's unincorporated areas) responded to the survey, for a total of 26 jurisdictions. These 26 jurisdictions cover an approximate area of 4,026 square miles (678 sq miles for cities + 3,348 sq miles for unincorporated areas) out of 4,751 sq miles for the whole county. This represents 84.7 percent of land in the county. Respondent jurisdictions are home to 64.3 percent of the county's population. This sample also represents six of the eight sunset climate zones present in Los Angeles County Urban Areas.[5,6] The jurisdictions in the sample also represent the six brackets of household median income fairly evenly. ˣˣˣ

Combining data from the respondent cities with that from municipalities that submitted their tree inventories to TreeMapLA, the status of street tree inventories is known for 51 out of 88 municipalities of Los Angeles County. This represents a good sample from which an assessment of urban forestry activities in the whole county can be made with confidence.

Figure 2: Climate Zone Representativeness of Survey Responses
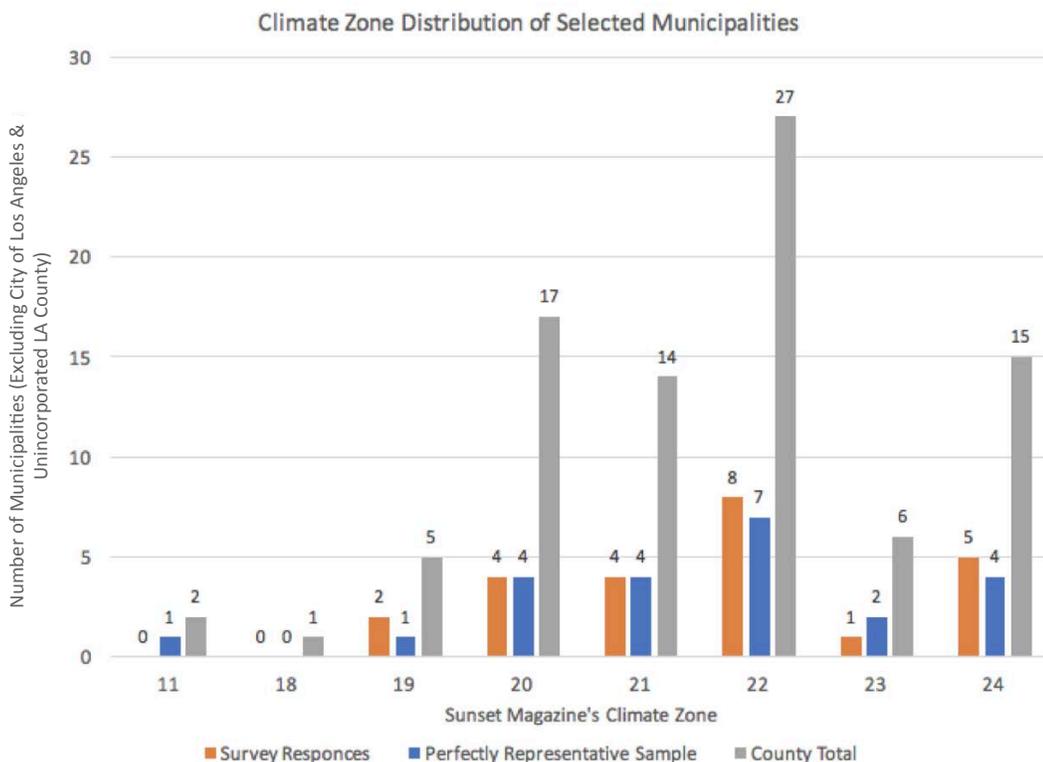
Figure 2 shows climate zone representativeness of the survey sample across eight climate zones present in Los Angeles County.

[5] The City of Los Angeles as well as the unincorporated areas of the county are so large that classifying them as being in one climate zone is impractical.
[6] If the city's boundary overlaps two or more climate zones, the climate zone representing the majority of land area was chosen.

Figure 3: Los Angeles County's Governmental Jurisdictions Represented in Survey Responses
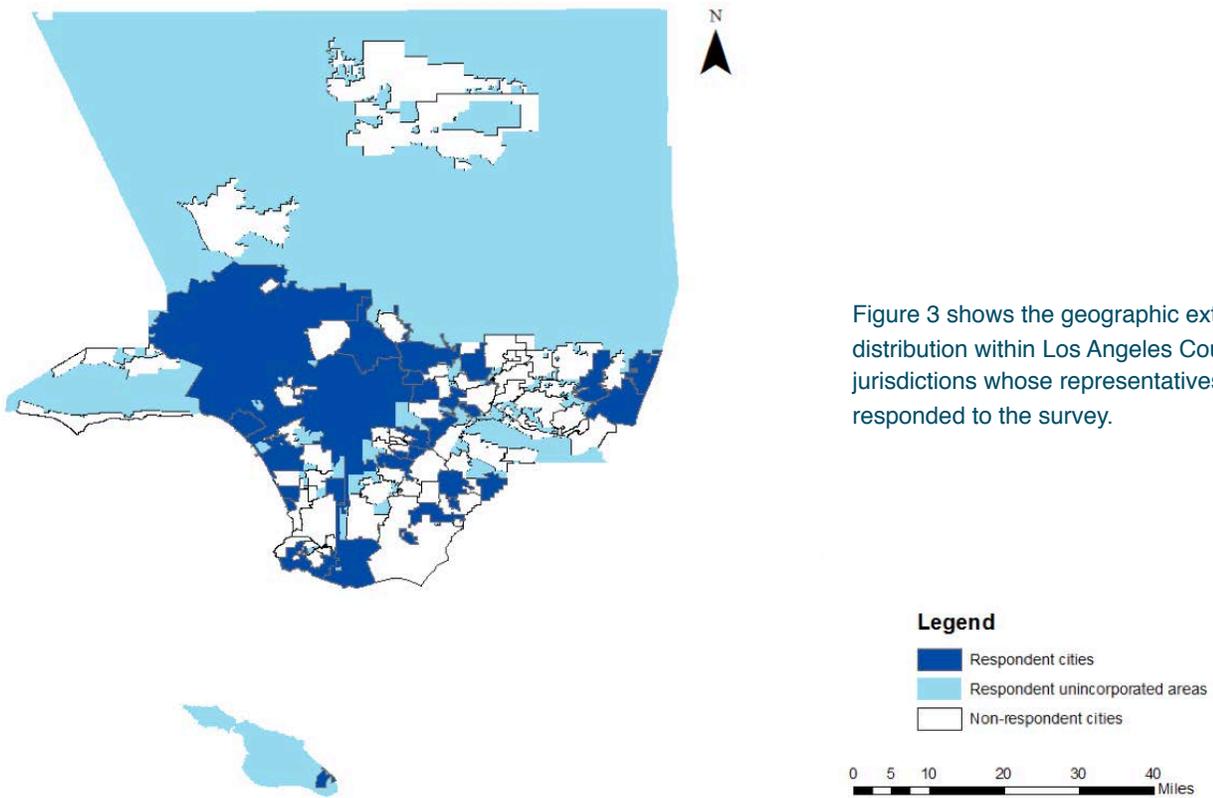
Figure 3 shows the geographic extent and distribution within Los Angeles County of jurisdictions whose representatives responded to the survey.

Legend
- ■ Respondent cities
- ■ Respondent unincorporated areas
- □ Non-respondent cities

0 5 10   20   30   40
Miles

Figure 4: Income Representativeness of Survey Responses
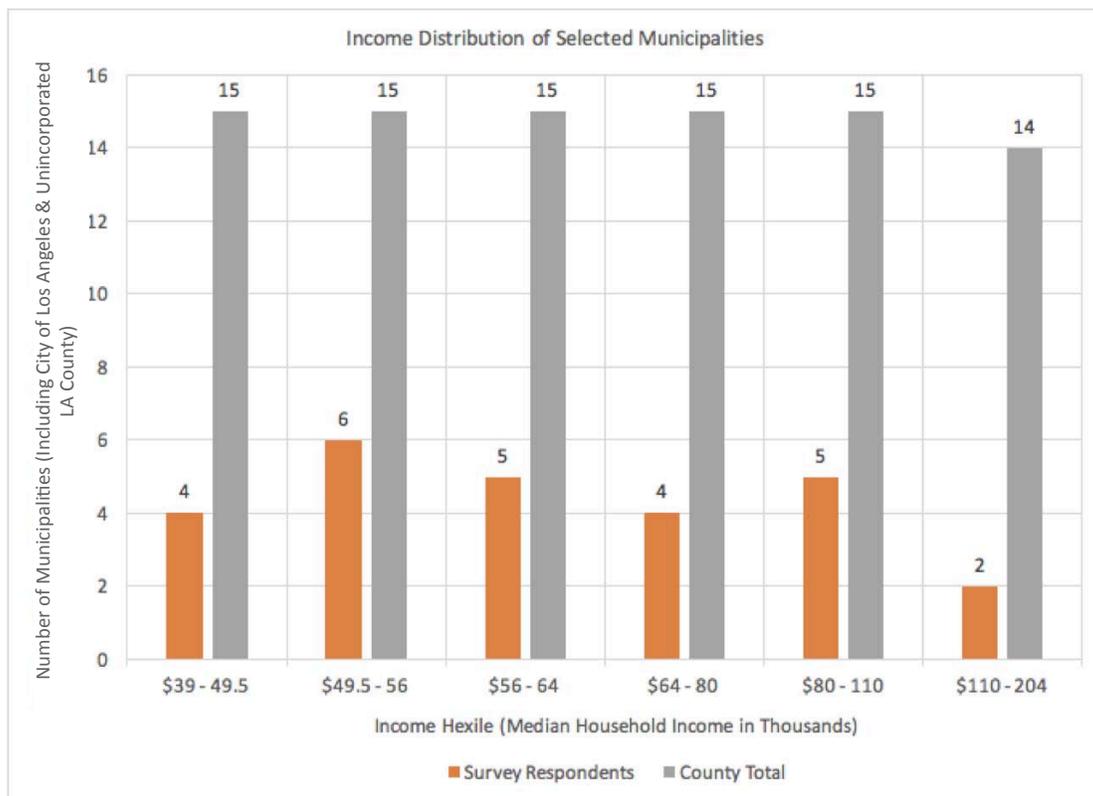
Figure 4 shows income representativeness of the survey sample across six median household income brackets.

The population sizes of the 88 cities in Los Angeles County vary widely. According to 2017 statistics released by the California Department of Finance, the smallest city in the county is Vernon, with 209 people, and the largest is the City of Los Angeles with a population of 4,041,707.[xxxi] In the sample of 26 respondent cities, the smallest was Avalon with 3,718 people, and the largest was the City of Los Angeles. For analysis purposes, the sample was sorted in a descending order of population size and was divided it into two groups: a large-cities group, made of the top 13 cities, and small-cities group, made of the bottom 13 cities. The survey responses were tabulated by these two groups to assess the variation of urban forestry activities by city size.

Table 1: Population Size Representativeness of Survey Responses

Larger-Population Cities	Population	Smaller-Population Cities	Population
City of Los Angeles	4,041,707	Rosemead	54,990
L A County Unincorp.	1,055,621	La Mirada	49,448
Glendale	200,600	Rancho Palos Verdes	42,753
Pomona	154,151	Claremont	36,165
Pasadena	140,960	Manhattan Beach	35,329
Norwalk	105,530	San Dimas	34,215
South Gate	98,581	South Pasadena	25,993
Santa Monica	93,282	South El Monte	20,798
Alhambra	86,237	Hermosa Beach	19,711
Lakewood	79,239	Artesia	16,820
Bell Gardens	76,657	Signal Hill	11,607
Montebello	63,792	Sierra Madre	11,013
Gardena	60,534	Avalon	3,718

MUNICIPALITIES' URBAN FORESTRY ACTIVITIES

In assessing urban forestry management activities in Los Angeles County, responses were analyzed by assessing the existence of the following:

- Urban forestry programs with frameworks of activities (e.g., urban forestry management plans, technical guidelines or tree ordinances)

- Urban forestry budgets

- Street tree inventories and their accessibility to the public

- Urban forest maintenance cycles

- Staff with professional backgrounds related to urban forestry
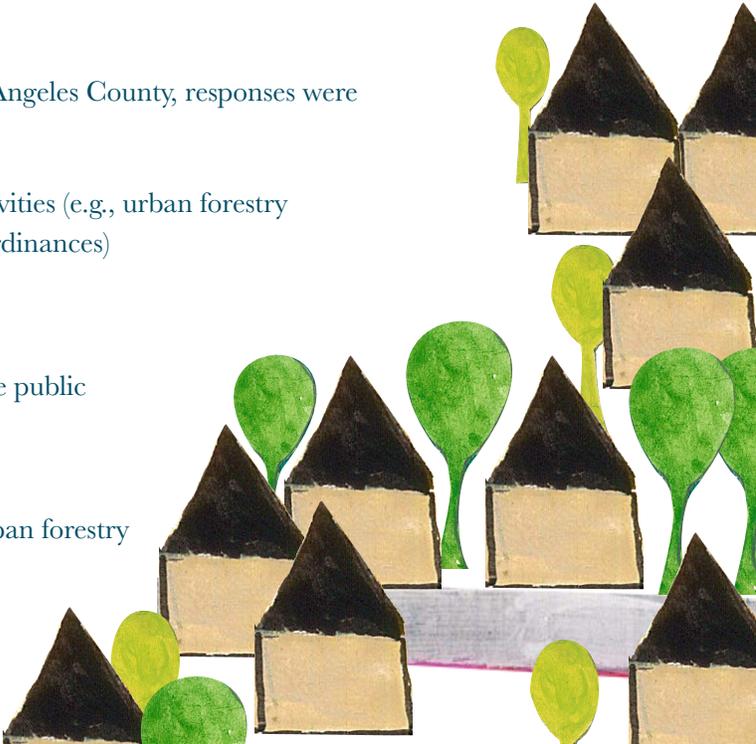
- Membership to urban forestry programs

Twenty-four out of 26 cities reported having urban forestry programs. Of these, 22 have frameworks that guide their urban forestry activities, including urban forestry management plans, street tree ordinances, street trees policies, street tree master plans and sections of their municipal codes addressing trees and shrubs. These frameworks state the cities' visions for their urban forest and specify the steps cities will take to achieve their vision, including technical guidelines, legal frameworks and funding mechanisms. Two cities, Bell Gardens and South El Monte, reported engaging in urban forestry activities without any of these frameworks, and an additional two, Artesia and Avalon, reported having no urban forestry programs at all. See Appendix B for more details.

## STREET TREE INVENTORIES AND DATA ACCESSIBILITY

The urban forestry programs reported by the 24 cities are comprised of activities ranging from tree planting and maintenance to community-based urban forestry, environmental restoration, environmental research and education. These cities make information available about their urban forestry activities through city websites, social media, newsletters, printed notices, public meetings and other types of communications.

Of the the 24 cities that reported having urban forestry programs, 22 have street tree inventories. Only two cities, Rancho Palo Verdes and Santa Monica, have built their own online data portals where street tree data can be publicly viewed in interactive maps. LA County reported plans to make its inventory publicly accessible once a GIS database is completed. Twenty other cities keep inventories internally. These are largely hosted and maintained by a private contractor for planning, monitoring and maintenance activities.

After building TreeMapLA in 2014, TreePeople petitioned cities throughout the county to use it as a platform through which cities and other entities could make their tree inventories public. TreePeople obtained data from 33 cities, seven of which are included in our survey sample. Combining data from TreeMapLA and our survey responses, the total number of cities that we know to have publicly accessible inventories is 35.

In summary, 22 cities in our sample have inventories, two of these inventories are publicly accessible through the cities' online portals, and seven are accessible through TreeMapLA. The remaining 13 cities in the survey keep their street tree inventories internally.

The Urban Tree Growth & Longevity (UTGL) Working Group is an independent collaborative of scientists and other professionals interested in urban forestry with a mission "to foster communication among researchers and professionals, enrich scientific exchange, and enhance the quality, productivity, and timeliness of research on tree growth, mortality and longevity through collaboration."[xxxii] UTGL recommends that, in order to be useful for long-term monitoring, an urban tree inventory data set should include, at a minimum, the following pieces of information: field crew information, tree species, location, site type, mortality status, condition rating and diameter at breast height. TreeMapLA database allows documentation of all of these details, and most of the cities' inventories on TreeMapLA contain them. Based on survey responses, the rest of the respondents' inventories also appear to meet these criteria. Bell Gardens and Hermosa Beach are the only cities in our survey that reported involvement in urban forestry but no street tree inventories. Artesia and Avalon reported no engagement in urban forestry activities. Most cities reported updating their inventories regularly, as they perform maintenance activities. Four indicated that they have fixed cycles for inventory update, ranging from monthly to every ten years.
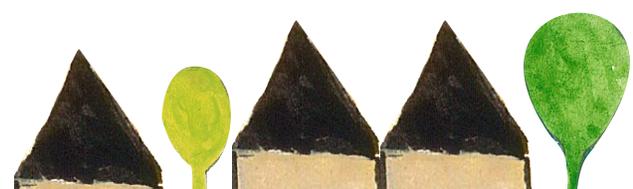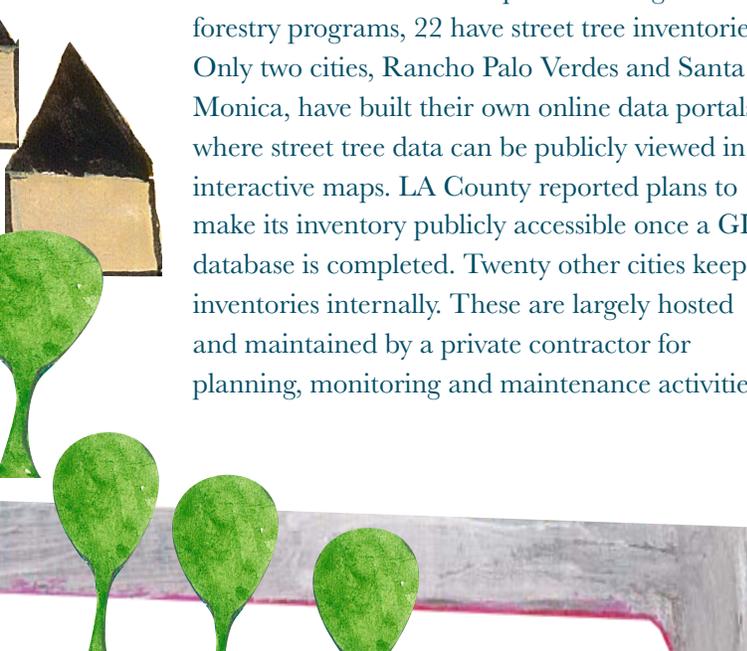
MAINTENANCE CYCLES

Tree maintenance, especially tree pruning, helps trees to keep their structural integrity. Urban trees in particular, require a higher level of maintenance as way to maximize benefits, prevent tree-related accidents and improve aesthetics while minimizing costs. While proper tree maintenance can only be assessed according to the biology of given tree species and individual trees, the survey nevertheless considered street tree maintenance cycles of respondent cities in an effort to showcase the variation of maintenance practices.[xxxiii]

We found that maintenance cycles vary greatly across the survey sample. Some cities have a fixed regular schedule for pruning and trimming, while others have schedules that vary according to tree species, size and other factors. The shortest maintenance schedule reported was one year (Bell Gardens, Manhattan Beach) and the longest was twenty to thirty years (City of Los Angeles). The maintenance schedule for the majority of respondents was between three and five years, and includes the cities of Norwalk, Rancho Palos Verdes, Rosemead, South Gate, Santa Monica, Alhambra, Lakewood, San Dimas, South Pasadena, Gardena, Glendale and Pomona. See Appendix D for further details.

FUNDING

Twenty-three cities reported having budgets for urban forestry activities. Eight respondents either agreed or strongly agreed that their budgets are adequate to cover their urban forestry needs, and another eight responded that their city's budget covers urban forestry needs neutrally. Four cities reported their forestry budgets to be insufficient. Artesia, Avalon and South El Monte reported not having an urban forestry budget at all, with Artesia and Avalon likely reporting no budget due to the fact they do not have any urban forestry programs.

STAFFING

Urban forestry operations are handled by a variety of departments across the surveyed cities, including Public Works, Public and Field Services, Parks and Recreation, and Office of the Mayor. Seventeen out of 26 cities have staff with professional backgrounds related to urban forestry. The education qualifications range from bachelor's to master's degrees in urban forestry and environmental resource management or related fields, as well as other technical qualifications including certified arborists, certified tree workers, landscape architects and horticulturists. Nine cities reported not having professional staff with urban forestry related backgrounds.

URBAN FORESTRY MEMBERSHIP PROGRAMS

Several urban forestry membership programs exist in the US that provide resources to urban forestry practitioners. Some of these programs offer educational and networking opportunities while others offer their members incentives such as awards and certifications for outstanding urban forestry programs. Many of these programs require cities meet certain urban forestry standards in order to become members, which, in combination with the resources they provide, can be a motivation for cities to improve urban forestry programs.

Fourteen cities in the sample reported participation in urban forestry membership and accreditation programs, such as Tree City USA and California ReLeaf. The participation in these programs does not appear to be correlated with particular income levels or population sizes, but cities in the sample which are members of these programs performed better on all indicators than non-members. All 14 participants in these programs have urban forestry programs and tree inventories. All but one reported having urban forestry frameworks, budgets and staff with forestry-related backgrounds, and only three

reported insufficient budgets. Of the ten other cities that reported not participating in these programs but which have urban forestry programs, two have insufficient budgets, two do not have tree inventories, six out have staff with related backgrounds, and one has no framework for urban forestry activities.

Descriptions of the programs named by the municipalities that responded to the survey follow, and potential implications of the status of cities' membership in these programs are assessed.

TREE CITY USA

Tree City USA is a membership program of the Arbor Day Foundation which provides municipalities with frameworks that allow them to manage and expand their public trees. Arbor Day Foundation is the largest nonprofit membership organization dedicated to planting trees. Its mission is to inspire people to plant, nurture and celebrate trees.[xxxiv] To achieve Tree City USA status, municipalities must maintain a tree board or department, have a community tree ordinance, spend at least $2 per capita on urban forestry and celebrate Arbor Day. In return for these commitments, cities reap the benefits provided by urban trees such as increased property values, energy savings and health benefits, while also gaining publicity and recognition for their urban forestry efforts.[xxxv] Eleven out of 26 cities in this survey are members of this program, including Claremont, Glendale, Lakewood, Norwalk, Pasadena, San Dimas, Santa Monica, Sierra Madre and South Pasadena. All these cities reported having urban forestry budgets, as required by the program, but three of them reported their budgets to be insufficient (Glendale, Rosemead and Sierra Madre). All have frameworks for their urban forestry activities and street tree inventories. All but one (La Mirada) have professional staff with urban forestry-related backgrounds.

INTERNATIONAL SOCIETY OF ARBORICULTURE

The International Society of Arboriculture (ISA) is a membership organization that certifies arborists and tree workers. There are six categories: ISA Certified Arborist, ISA Certified Arborist Utility Specialist, ISA Certified Arborist Municipal Specialist, ISA Certified Tree Worker Climber Specialist, ISA Certified Arborist Tree Worker Aerial Lift Specialist and ISA Board Certified Master Arborist. It is the industry standard to be certified through their programs if an individual is an urban forestry professional. Although the ISA does not certify organizations, companies or municipalities, the individuals of such groups are often required to be ISA certified. The ISA is also a premiere urban forestry educational source and outlet, keeping urban forestry professionals current with new research.

SOCIETY OF MUNICIPAL ARBORISTS (SMA)

SMA is an organization of municipal arborists and urban foresters professionally affiliated with the International Society of Arboriculture (ISA). SMA uses multiple channels to provide networking and educational opportunities to its members and to promote sound management of urban trees. The respondent from the City of Santa Monica was the only one in the sample that reported being a member of SMA. This program also accepts private individuals as members, and thus more urban foresters within the sample may be members without being officially affiliated with their city.

CALIFORNIA URBAN FORESTS COUNCIL (CaUFC)

CaUFC is a coalition of professionals associated with various municipal departments dedicated to enhancing the quality of life for all Californians through sustainable urban and community forests. Among other things, CaUFC provides educational and networking opportunities, and most importantly, hosts an annual conference and awards ceremony for outstanding urban forestry programs in California. Claremont is the only city in the survey sample that reported being a member of this council.

Several cities in the sample have street tree inventories hosted privately by a contractor or publicly accessible through TreeMapLA. Only two cities reported maintaining their own publicly accessible tree data portals.

TREE INVENTORY: RANCHO PALO VERDES

Rancho Palo Verdes' interactive inventory has information including tree species, location address, date, height range, DBH, condition, information on conflict with utility poles and data collector information, among other data. The inventory is regularly updated by the city's contractor. General trimming schedules can also be viewed on this database.

The inventory is accessible at http://maps.rpvca.gov/Html5Viewer/index.html?viewer=CityofRPV_TreeInventory

TREE INVENTORY: SANTA MONICA

Santa Monica makes limited tree inventory data publicly accessible through an open source data portal. This database includes information on about 35,000 street trees, including species, location address, GPS coordinates, DBH, height, tree location in relation to nearest structure, pruning history and replacement species.

The inventory is accessible at https://data.smgov.net/browse?category=Public+Assets

RESPONDENT PUBLIC INTEREST ORGANIZATIONS

Eight out of 27 public interest organizations identified by STEW-MAP LA responded to the survey. These organizations include nonprofit organizations focusing on the environment (e.g., Industrial District Green), social and environmental justice (e.g., Social Justice Learning Institute), a local botanical garden wishing to remain anonymous, three neighborhood councils (Canoga Park, Eagle Rock and South Robertson), and a business organization (EcoKai Environmental). See Appendix D for list of public interest organizations surveyed.

Figure 5: Public Interest Organizations Represented in Survey Responses

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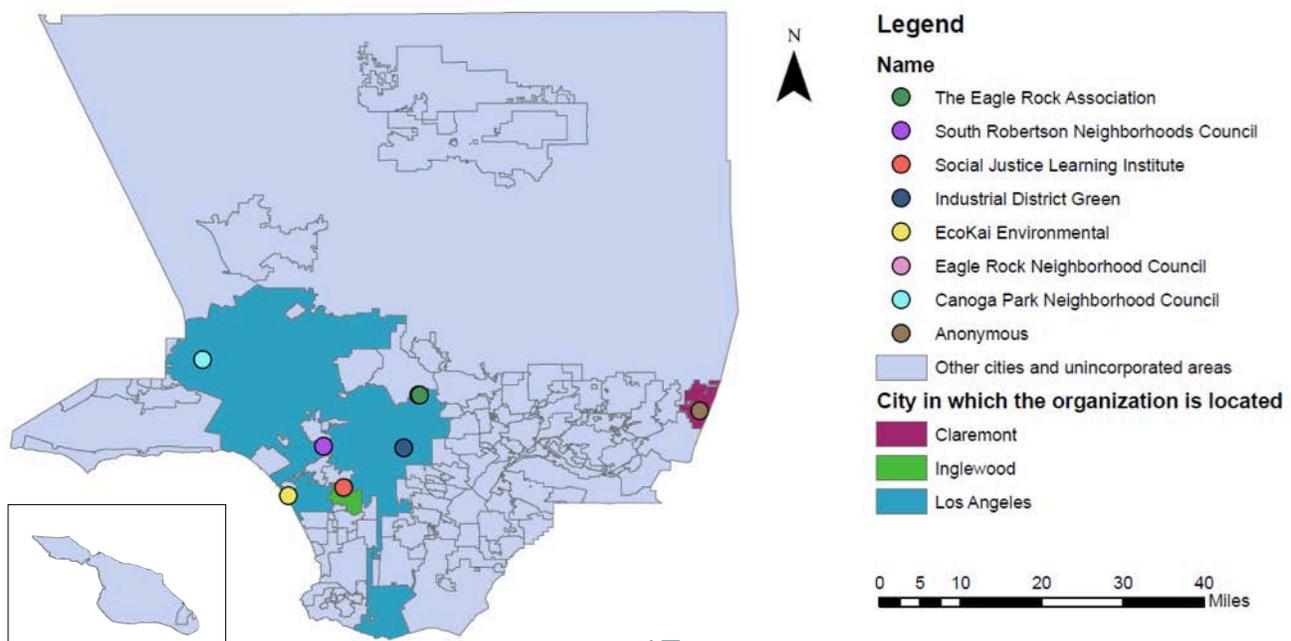
PUBLIC INTEREST ORGANIZATIONS' URBAN FORESTRY ACTIVITIES

STREET TREE INVENTORIES AND DATA ACCESSIBILITY

Six out of the eight organizations are involved in urban forestry activities such as tree planting, tree care, community-based urban forestry and environmental research and education. Two of these organizations also keep inventories of the trees they plant, but neither is publicly accessible. Industrial District Green operates only in Downtown LA's Industrial District and uses the urban forestry software Plan-It GEO for planning, data collection and regular updates for its inventory. Eagle Rock Association reported partnering with the Eagle Rock Neighborhood Council and the Council Office in 2014 to plant 270 trees on five streets of Los Angeles' Eagle Rock neighborhood. Since then they have been involved in tree watering and maintenance, and keep an inventory of trees they maintain. Canoga Park Neighborhood Council and EcoKai Environmental reported no engagement in urban forestry activities.

FRAMEWORKS FOR URBAN FORESTRY ACTIVITIES

Although none of these organizations has developed their own urban forestry management plans or frameworks, Eagle Rock Association, Industrial District Green and Social Justice Learning Institute have adopted urban forestry guidelines from the cities they are located in.

MAINTENANCE CYCLES

Four of the respondent public interest organizations engage in tree maintenance. The Eagle Rock Neighborhood Council and Industrial District Green reported watering their trees at least monthly. The Eagle Rock Association reported partnering with another organization, the Collaborative Eagle Rock Beautiful (CERB), to water street trees weekly in the summertime. The botanic garden reported no regular schedule for street tree maintenance.

FUNDING

Industrial District Green, South Robertson Neighborhood Council and the botanic garden reported having budgets for urban forestry activities. South Robertson Neighborhood Council's urban forestry funding comes from its annual budget, while the botanic garden funding comes from donors who contribute specifically toward tree work. None of these organizations reported their budget to be sufficient.

STAFFING

Three of these organizations have staff with urban forestry professional backgrounds. Eagle Rock Neighborhood Council pays a contractor to water and maintain street trees, but also has members and partners that work in landscaping. Industrial District Green's co-founder is a licensed landscape architect. The organization also employs a "Street Tree Team" that updates its tree data and performs maintenance on a monthly basis with the assistance of a part-time employee who helps with tree identification. The botanic garden that wished to remain anonymous has staff that includes horticulturists, arborists and botanists. Eagle Rock Association uses volunteers to collect data and update its tree inventory approximately every six months.

TreeMapLA: A Publicly Accessible Tree Database

TreeMapLA is a web-based database with accompanying mobile apps (Google Android and Apple iOS) designed to facilitate the collection and presentation of tree data in Los Angeles County. TreeMapLA, based on the crowd-sourced OpenTreeMap software, is designed to track the progress of Los Angeles' urban forest through citizen data collection as well as sharing the tree inventories of participating cities and other entities. Using the app, members of the public can upload a tree's location (recorded using the mobile phone's GPS), height, diameter at breast height (DBH), date planted, species and planting site information. In practice, most users typically only record location, diameter and species. The tool can also be used to register watershed solutions such as rain gardens and rainwater-harvesting systems and update their needs. TreeMapLA is the result of a collaboration of nonprofits, local government, businesses and Los Angeles residents to map the urban forests and watersheds of Greater Los Angeles.

As of the publishing of this report, TreeMapLA includes 784,228 trees and 72,775 potential planting sites. The vast majority of these trees and almost all of the planting sites were uploaded from either city or maintenance contractors' databases. These data constitute full street tree inventories for 33 cities and three other non-city entities. To supplement these data, most of the public's efforts have been concentrated around organized volunteering events coordinated by TreePeople, which the organization hosted with some frequency in the months following the map's release. Those events have largely ceased due to limited funding and staff available to provide support. As well, independently cataloging trees has not been actively embraced by community members and use of this publicly-accessible tool has not grown significantly despite a period of sustained publicity attempts by TreePeople.
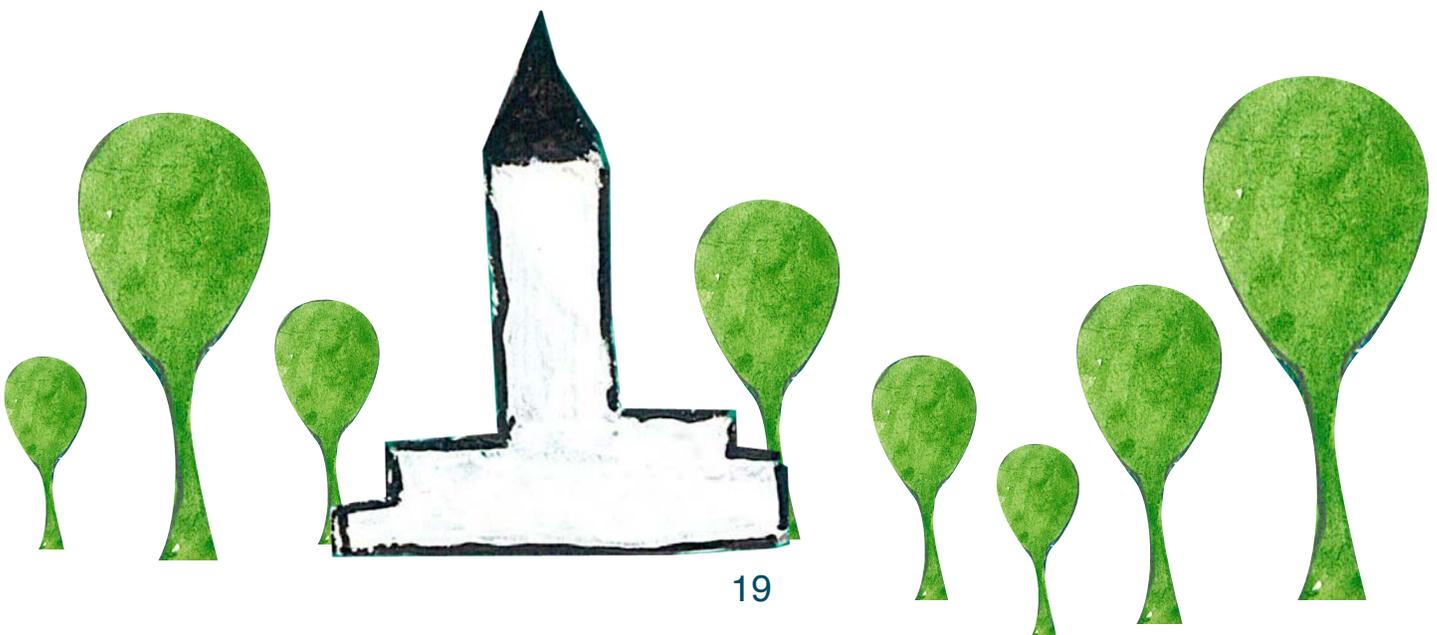
While TreeMapLA is designed to be user-friendly and publicly-accessible, it is not designed to provide the sophistication required by cities to meet complex urban forestry management needs and is thus not in itself a sufficient tree management system for municipalities. For example, it cannot be used to create work orders or easily track the progress of tree care. Furthermore, while TreeMapLA quantifies per-tree environmental and economic benefits using values from the peer-reviewed i-Tree software suite of the US Forest Service, these values cannot be used to track the greenhouse gas reduction benefits for projects funded by the State's Greenhouse Gas Reduction Fund. For TreeMapLA to qualify to track these benefits, it would need to be approved by the California Air Resources Board, and currently there are no efforts to make that happen.

In its current form, TreeMapLA is suitable as an educational and community engagement tool. As a companion to TreeMapLA, TreePeople created the *Tree Canopy Investigation Project Toolkit* in consultation with LA Unified School District curriculum experts. This curriculum guide, which aligns with science, technology, engineering, art and math (STEAM) standards, takes teachers through the process of having students measure the percentage of canopy cover at their school, determine the eco-benefits that existing trees provide using TreeMapLA, and calculate how many additional trees would need to be planted to create a targeted percent canopy cover. This process uses the same i-Tree calculations that underlie TreeMapLA.

TreeMapLA functions as a user-friendly public database. It allows users to easily determine statistics about neighborhood street trees and can potentially lessen the burden on cities. Lastly, TreeMapLA serves to promote trees and bring together like-minded people and organizations around improved urban forest management. For example, TreeMapLA led to the California Institute of Technology (Caltech) reaching out to TreePeople to request advice on the urban forestry aspects of a groundbreaking digital tree identification tool being built by their world-renowned computer scientists — a system that TreePeople was able to recommend to the City of LA and is now being used in the City's urban forest management efforts. Nevertheless, though TreeMapLA is a useful tool, its approximate annual cost of operation of $50,000 to $100,000 must be evaluated in context.
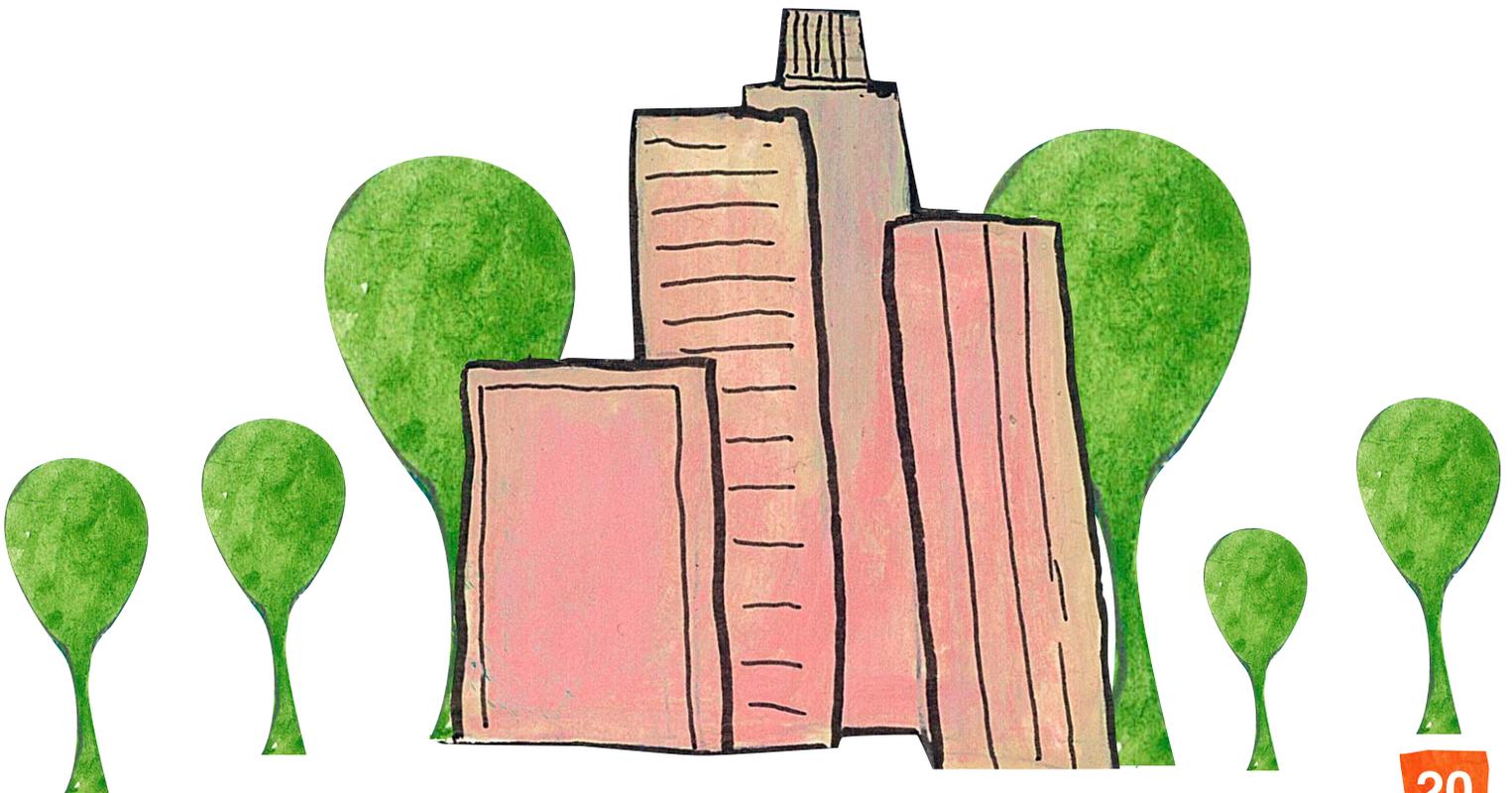
PUBLICLY AVAILABLE URBAN FORESTRY RESOURCES

CALIFORNIA URBAN FORESTS COUNCIL'S URBAN FORESTRY MANAGEMENT PLAN TOOLKIT

This toolkit was developed by the Inland Urban Forest Council (IUFC), a regional affiliate of the California Urban Forests Council (CaUFC), to address the lack of consistent planning for urban forestry development and management in the region, especially in small municipalities and organizations that lack sufficient resources. The toolkit provides an easy-to-use, step-by-step guide to the process of developing urban forestry management plans. Some cities in LA County, including Long Beach, have used this toolkit for their forestry activities. The toolkit can be found at http://ufmptoolkit.net/.

TREE GUIDELINES FOR COASTAL SOUTHERN CALIFORNIA COMMUNITIES

This publication of the USDA Forest Service, Pacific Southwest Research Station provides urban foresters in coastal Southern California communities with guidelines for developing their urban forestry programs in a way that maximizes tree benefits and minimizes costs. This includes guidelines for selecting appropriate trees for the desired benefits, quantifying the costs associated with maintaining them and incorporating all of that into program design and implementation. This resource is helpful to cities that lack resources or forestry experts. Other useful resources from the USDA include the Urban Forest Inventory and Analysis (FIA), which uses USDA Forest Service's peer reviewed i-Tree software to produce estimates of the quantity, health, composition and benefits of urban trees and forests nationwide. The Tree Guidelines publication can be found at https://caufc.org/wp-content/uploads/2017/03/Coastal_So_Cal_Tree_Guide.pdf.

CLIMATE READY TREES PROJECT

The University of California, Davis is conducting a long-term study to identify underutilized tree species that are resilient to the stressors associated with climate change in three of California's climate zones. After selecting candidate species by consulting expert horticulturalists and analyzing tree inventory data for a sample of cities in each climate zone, these species were planted in Central Valley, Inland Empire and Southern California's coastal climate zones. The plan is to closely monitor these trees for at least 20 years, with updates on growth and survival posted annually on the project's website (http://climatereadytrees.ucdavis.edu/). Yearly updates provide foresters with the latest information on species resilience to climate change.
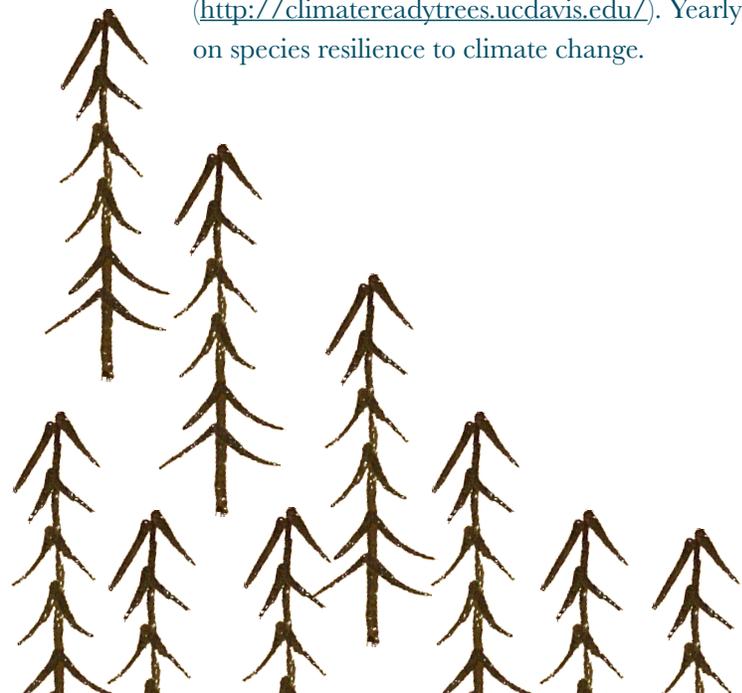
CAL FIRE URBAN AND COMMUNITY FORESTRY PROGRAM

The California Department of Forestry and Fire Protection (CAL FIRE) provides qualified applicants with matching grants to conduct tree inventories through its Urban and Community Forestry Program. These grants can cover costs related to education and training and the acquisition of inventory systems such as data collection software. The recipients of these grants can be cities, counties or districts which have staff with training related to urban forestry, such as an urban forester or arborist, and an existing urban forest or street tree protection system such as a city ordinance. CAL FIRE's grant awards records for 2016/2017 indicate that Claremont and Los Angeles County are the two municipalities surveyed that benefited from these grants specifically to conduct tree inventories. In addition to these grants, CAL FIRE also produces various technical guidelines that provide urban forestry managers with information on best practices in tree care and management. Information is available at http://www.fire.ca.gov/resource_mgt/resource_mgt_urbanforestry

URBAN TREE KEY

The Urban Tree Key is an online tool created to help identify tree species commonly found in California's urban areas. This project was a partnership between the Urban Forest Ecosystems Institute (UFEI) at California Polytechnic State University, San Luis Obispo, the San Francisco Department of the Environment, CAL FIRE and the San Francisco based nonprofit organization Friends of the Urban Forest, to assist amateur arborists in collecting data for San Francisco's Urban Forest Map. While this tool was developed for tree species found in Northern California, many of those species are also found in Southern California, making this tool a good resource for Los Angeles County as well. It can be accessed at http://urbantreekey.calpoly.edu/.

CALIFORNIA RELEAF

California ReLeaf is a nonprofit organization that supports grassroots efforts through education, advocacy and funding "to preserve, protect, and enhance California's urban and community forests."[xxxvi] In 1991, two years after its founding, the organization formed the California ReLeaf Network to serve as a forum for "...exchange, education, and mutual support for community-based organizations that share the common goals of planting and protecting trees, fostering an ethic of environmental stewardship, and promoting volunteer involvement." Today, the network has grown to include around 100 grassroots organizations throughout the state, with various areas of focus including arboreta and botanical gardens, education and job training programs, and at-risk youth education, among others. More details on this network can be found at http://californiareleaf.org/network/.

To join this network, grassroot organizations pay a suggested donation of $120 annually. Given its wide membership, diversity of organizations and grassroots presence, the California ReLeaf Network is a great resource not only for member organizations themselves, but also for those interested in supporting urban forestry efforts at the local level. The diversity of member organizations in particular provides a great opportunity to approach urban forestry from different angles.

The maintenance schedules in the survey sample show no clear pattern or correlation with income level. Respondents of this survey indicated that risk management takes precedence over any other urban forestry activity, and that maintenance is mainly done to minimize the risk of liability as much as possible.

DISCUSSION

URBAN FORESTRY ACTIVITIES ACROSS INCOME LEVELS

To facilitate an analysis of municipalities' urban forestry activities by income level, the sample was divided into two groups, with one consisting of the top three brackets of median household income, and the other consisting of the three bottom brackets. The top three income brackets are comprised of 11 cities (Santa Monica, Lakewood, La Mirada, Rancho Palos Verdes, Claremont, Manhattan Beach, San Dimas, South Pasadena, Hermosa Beach, Signal Hill, Sierra Madre). These cities are considered "higher-income" cities. The bottom 3 are comprised of 15 jurisdictions (City of Los Angeles, Los Angeles County, Glendale, Pomona, Pasadena, Norwalk, South Gate, Alhambra, Bell Gardens, Montebello, Gardena, Rosemead, South El Monte, Artesia, Avalon). These cities are considered "lower-income" cities.

All 11 higher-income cities have urban forestry programs, budgets for those programs, and some form of framework (urban forestry management plans, community forest management plans, city tree protection ordinances, street tree policies, municipal codes, or other). Five cities in this group reported having urban forestry budgets that adequately cover their needs, with one strongly agreeing, and four agreeing. Four other cities in this group somewhat agreed that they have budgets covering their urban forestry needs. Manhattan Beach, which has the highest median household income in the sample, responded neutrally (neither agrees nor disagrees). Sierra Madre is the only city in the top three income brackets that disagrees that its budget adequately covers its urban forestry activities. It is important to note that the responses about budget adequacy may reflect the respondent's own perception, and not necessarily an objective assessment of budget needs.

All but one city in this group (Hermosa Beach) have street tree inventories, six of which of are publicly accessible either through the city's data portals (Santa Monica and Rancho Palo Verdes) or TreeMapLA (Lakewood, Claremont, San Dimas and Signal Hill). Eight out of 11 cities in the top three income brackets have staff with a professional background related to urban forestry and six participate in one or more multi-city urban forestry membership or accreditation programs.

Among lower-income cities, two out of 15 reported having no urban forestry programs (Artesia and Avalon). These two cities, in addition to South El Monte, have no budget for urban forestry activities. Six of 15 cities reported having sufficient budgets (South Gate, Bell Gardens, Norwalk, Los Angeles County, Alhambra, Anonymous); Pasadena was neutral about its budget's adequacy; and four cities reported inadequate budgets (Glendale, Pomona, Gardena and Rosemead).

Nine out of 15 lower-income cities have professional staff with backgrounds related to urban forestry, while three others do not. Eleven have urban forestry frameworks, two do not. Of the 13 cities in this group that have urban forestry programs, Bell Gardens is the only one that does not have a tree inventory. The tree inventories of Glendale, Pasadena and Norwalk are publicly accessible on TreeMapLA. Nine others do not make their inventories publicly accessible. Six cities in this group are members of one or more urban forestry membership programs.

With regards to tree maintenance, five cities do maintenance based on the species and/or size of the trees (Hermosa Beach, Santa Monica, LA County, Pasadena, South El Monte). The rest do maintenance following fixed regular schedules that depend on the city's' guidelines and maintenance plans. The maintenance schedules in the survey sample show no clear pattern or correlation with income level. Respondents of this survey indicated that risk management takes precedence over any other urban forestry activity, and that maintenance is mainly done to minimize the risk of liability as much as possible. According to the USDA Forest Service, tree maintenance as risk management should be done as it relates to the level of risk for failure determined by trained personnel, in a way that "reduces the risk for injury and damage to people and property to levels that are considered acceptable in accordance to city policies and practices."[xxxvii] As such, maintenance schedules are merely an indication of the level of tree-related liability risks a city considers acceptable rather than a performance indicator or a basis from which to evaluate municipal urban forestry practices. Given cities' budget constraints, this risk may in fact not be what is considered acceptable, but rather the best that can be achieved in terms of risk reduction with limited available resources.

OUTLIER MUNICIPALITIES

Some cities in the sample gave responses that are inconsistent with the general trends in the sample or simply discrepant with other responses from the same respondent. The issue of outliers is also addressed in the Study Limitations section of this report.

For example, Bell Gardens is among the lowest-income cities in the sample, and indeed in LA County, yet reported having the shortest tree maintenance cycle of one year. Along with South Gate, another city in the lowest median income bracket, Bell Gardens strongly agreed that their urban forestry budget is sufficient. South El Monte, also in the lower-income cities category, reported having no urban forestry budget but having an urban forestry program with professional staff.
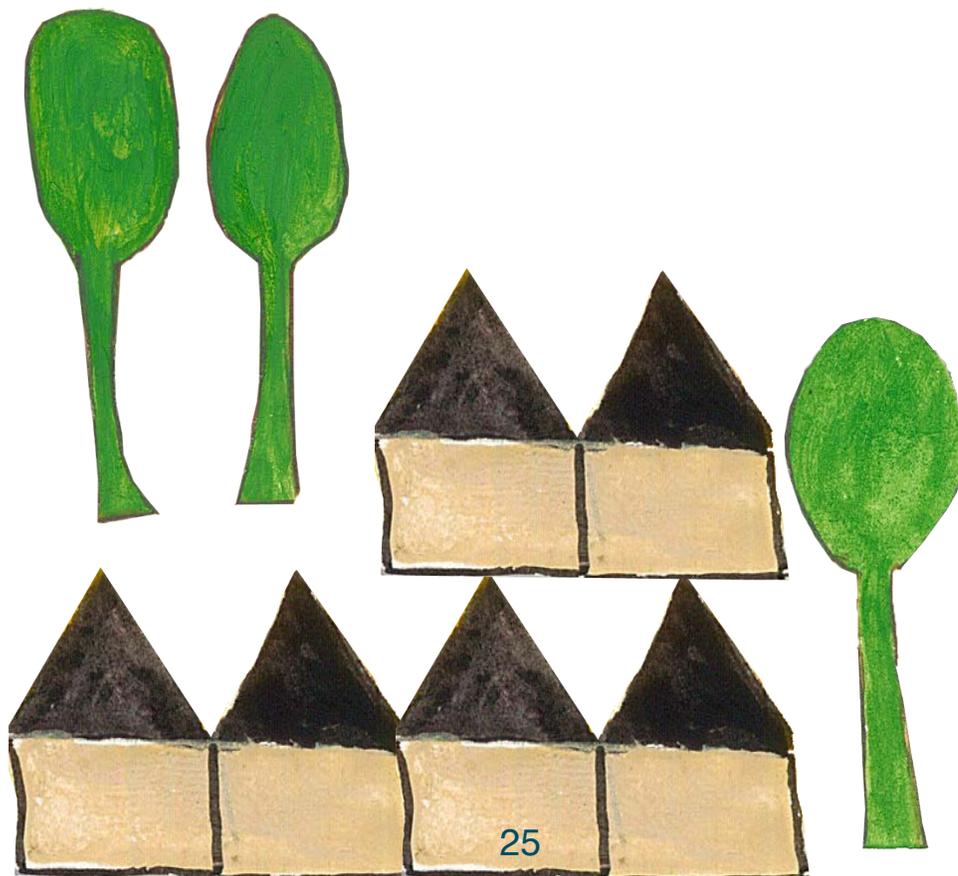
URBAN FORESTRY ACTIVITIES ACROSS POPULATION SIZES

The sample of 26 respondent municipalities was sorted in a descending order of population size and divided into two groups: a "larger-population" cities group, made of the largest 13 cities, and a "smaller-population" cities group, made of the smallest 13 cities. In the larger-population cities group, all except two were in the three bottom income brackets. These cities all have urban forestry programs and budgets, with seven reporting sufficient budgets, three insufficient and two responding neutrally. Eleven out of 13 have professional staff with backgrounds related to urban forestry. All but one of the cities in the larger-population cities group have street tree inventories and frameworks for their urban forestry activities. Six of them are part of one or more urban forestry membership and accreditation programs.

The smaller-population cities group generally has higher median household incomes, as nine out of 13 are in the top three income brackets. All but two have urban forestry programs. In terms of funding, two cities reported not having urban forestry programs or budgets. Eight cities in this group have professional staff with backgrounds related to urban forestry. Ten out of 13 have frameworks for their urban forestry activities and street tree inventories, while seven participate in multi-city urban forestry membership programs.

COMBINATION OF POPULATION SIZE AND INCOME IN RELATION TO URBAN FORESTRY

In prior sections of this report we discuss how factors of income and population size individually relate to municipalities' urban forestry programs. The trend in the sample is that higher-income cities have more urban forestry programs with budgets, staff, frameworks for their urban forestry activities and tree inventories than lower-income cities. The same trend is observed with regards to population size, where larger-population cities reported more involvement in urban forestry than smaller ones. In this section we analyze how these two factors combined relate to urban forestry activities in the sample.

For this we defined a smaller-population and higher-income city as one whose population size ranks in the bottom half of the whole sample, while its median household income is in the top of the three income brackets of all the cities in the county. This group is made of nine cities (La Mirada, Rancho Palo Verdes, Claremont, Manhattan Beach, San Dimas, South Pasadena, Hermosa Beach, Signal Hill, Sierra Madre). Larger-population and lower-income cities are in the top half group of population size and bottom of the three brackets of income. This group is made of 10 cities and unincorporated areas, for a total of 11 municipalities (City of Los Angeles, Los Angeles County, Glendale, Pomona, Pasadena, Norwalk, South Gate, Alhambra, Bell Gardens, Montebello, Gardena). Smaller-population and lower-income cities are those whose population size ranks in the bottom half of the whole sample, while their median income is in the bottom third of all the cities in the county. This group is made of four cities (Artesia, Avalon, Rosemead, South El Monte). Two cities (Santa Monica and Lakewood) fell in the category of larger-population and higher-income cities, which means they are in the top half group of population size and top third income bracket. The following tables illustrate these classifications.

Table 2: Smaller-Population and Lower-Income Cities

City	Population	Annual Household Median Income	Income Bracket
Artesia	16,820	$60,500	3
Avalon	3,717	$53,200	2
Rosemead	54,990	$49,400	1
South El Monte	20,798	$46,900	1

Table 3: Smaller-Population and Higher-Income Cities

City	Population	Annual Household Median Income	Income Bracket
La Mirada	49,448	$83,500	5
Rancho Palos Verdes	42,753	$128,300	6
Claremont	36,165	$89,800	5
Manhattan Beach	35,329	$136,500	6
San Dimas	34,215	$84,900	5
South Pasadena	25,993	$76,200	4
Hermosa Beach	19,711	$109,500	5
Signal Hill	11,607	$66,300	4
Sierra Madre	11,013	$88,000	5

Table 4: Larger-Population and Lower-Income Cities

City	Population	Annual Household Median Income	Income Bracket
City of Los Angeles	3,999,237	$50,200	2
Los Angeles County unincorporated areas	1,055,621	$56,200	3
Glendale	200,600	$57,100	3
Pomona	154,151	$54,200	2
Pasadena	140,960	$62,800	3
Norwalk	105,530	$62,400	3
South Gate	98,581	$48,300	3
Alhambra	86,237	$53,200	2
Bell Gardens	76,657	$41,500	1
Montebello	63,792	$52,600	2
Gardena	60,534	$52,900	2

Table 5: Larger-Population and Higher-Income Cities

City	Population	Annual Household Median Income	Income Bracket
Santa Monica	93,282	$69,000	4
Lakewood	79,239	$78,800	4

In the study sample, correlations between income and population size are consistent with previous studies that have found high income and population size to be positively correlated with more robust urban forestry programs and tree cover in US cities.

Smaller-population and higher-income cities perform well on most survey indicators. They have urban forestry programs, budgets and frameworks for their urban forestry programs (nine out of nine), professional staff (six out of nine), and inventories (eight out of nine, with one publicly accessible). Membership to urban forestry programs is the only indicator that appears to be low (five out of nine).

All cities in the larger-population and lower-income group reported having urban forestry programs and related budgets (two out of 11 reported budgets to be insufficient), eight out of 11 have staff with urban forestry backgrounds, and all but one have frameworks and tree inventories (three are publicly accessible through TreeMapLA). Four out of 11 are members of one or more urban forestry membership programs.

Two cities in the smaller-population and lower-income group do not have urban forestry programs (Artesia and Avalon). Rosemead and South El Monte have staff with an urban forestry-related professional background, but only Rosemead has an urban forestry budget (reported to be insufficient) and an urban forestry framework. Both reported having street tree inventories that are not publicly accessible and both are members of urban forestry membership programs.

The two larger-population and higher-income cities have urban forestry programs, reported having sufficient budgets, staff with urban forestry-related backgrounds, frameworks for their urban forestry activities and publicly accessible tree inventories.

In the study sample, correlations between income and population size are consistent with previous studies that have found high income and population size to be positively correlated with more robust urban forestry programs and tree cover in US cities.[xxxviii] In the sample, the largest municipalities by population size generally have lower median household income compared to the smaller cities, which seems to attenuate the expected good performance in their urban forestry programs. This observation also holds for smaller-population and higher-income cities, which by virtue of being higher-income would be expected to perform well, but instead performed moderately, relative to others in the sample. The lowest performance is from smaller-population and lower-income cities, while the best performing group on all of our indicators in the sample is the larger-population and higher-income group.

The trends in the sample can be summarized in the table below. See appendix for more detailed tables.

Table 6: Cities' Urban Forestry Program Performance by Population and Income

	Higher-Income Cities	Lower-Income Cities
Larger-Population Cities	High Performance	Medium Performance
Smaller-Population Cities	Medium Performance	Low Performance

As the study sample was small, further studies would be necessary to determine whether these trends hold true for all cities in the county with the same characteristics of income and population size. If confirmed, this could help decision makers be more strategic in focusing efforts and resources.

URBAN FORESTRY ACTIVITIES ACROSS CLIMATE ZONES

To assess urban forestry activities variations across climate zones cities were classified into their corresponding Sunset Magazine climate zones.[xxxix] For cities that spanned more than one climate zone, the zone containing the majority of that city's land area was chosen to represent the entire city. Due to their large sizes, the City of Los Angeles and County of Los Angeles' unincorporated areas did not lend themselves to this type of classification: their land area covers all the eight climate zones present in the county. It was determined that it would be misleading and simplistic to group all of the 8 climate zones into one; therefore those two jurisdictions were not classified by climate. Following this classification methodology, six of the eight Los Angeles County climate zones were represented in the study.

Table 7: Cities and Climate Zones

Zone 19 - Thermal belts around Southern California's interior valleys	Zone 20 - Cool winters in Southern California's areas of occasional ocean influence	Zone 21 - Thermal belts in Southern California's areas of occasional ocean influence	Zone 22 - Cold-winter portions of Southern California's coastal climate	Zone 23 - Thermal belts of Southern California's coastal climate	Zone 24 - Marine influence along the Southern California coast
Pomona, Claremont	Glendale, Alhambra, Rosemead, South El Monte	Pasadena, San Dimas, South Pasadena, Sierra Madre	Norwalk, South Gate, Lakewood, Bell Gardens, Gardena, La Mirada, Signal Hill	Anonymous[7]	Santa Monica, Rancho Palos Verdes, Manhattan Beach, Hermosa Beach

The climate zones in which urban forestry activities have any clear pattern also have similar income levels. For example, in climate zone 20, which is made of only cities in the bottom three income brackets, all the cities have insufficient budgets, while in climate zone 24, which is only made of cities in the top three income brackets, all have adequate budgets. This suggests that, income, not climate zone, has an influence on urban forestry in our sample, especially since the correlation between income and urban forestry has already been well established. Although the results did not reveal variations of urban forestry practices in the county based on climate zones, definitive conclusions cannot be drawn as the research did not delve into details such as tree species selection. Such an analysis would be necessary for a comprehensive assessment.

[7] Some respondents requested anonymity
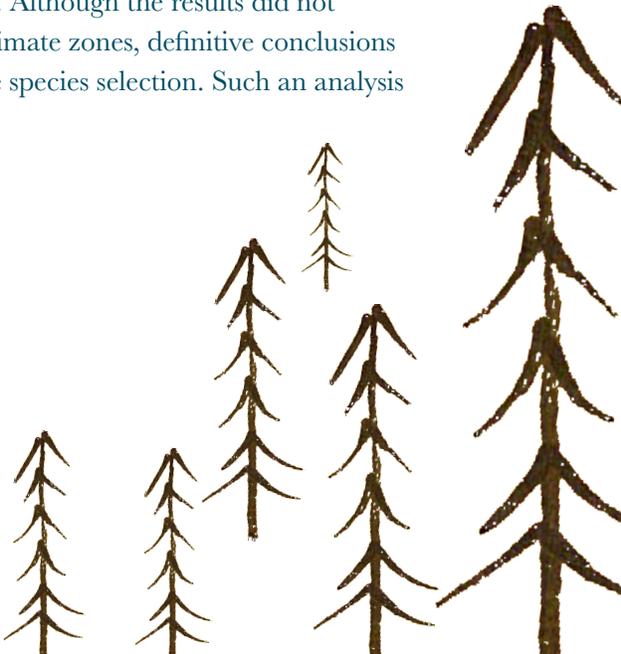
CASE STUDY HIGHLIGHTS

In the course of the survey, a number of robust municipal urban forestry programs emerged which serve as exemplary relative to other surveyed programs. In this section we highlight two case studies from municipalities of different characteristics. One is Santa Monica, classified a higher-income, larger-population city; the other is Los Angeles County, which classified as a lower-income, larger-population jurisdiction. Their respective programs are discussed in detail in the hopes that they can serve as reference points for municipalities with similar characteristics.

SANTA MONICA

Santa Monica is among the surveyed cities with the most robust urban forestry programs. The city has held the Tree City USA status for 36 years in a row and in 2016 qualified for a Tree City USA Growth Award.[xl] This award is offered by the Arbor Day Foundation to participating Tree City USA communities that exhibit higher levels of tree care, innovative programs and increased commitment of resources for urban forestry.[xli] Santa Monica's program and activities were also recognized by the American Public Works Association (APWA) as public works best practices.[xlii] Santa Monica's urban forestry program is housed under the Public Landscape Division of the Public Works Department, and its budget comes entirely from the city's general fund. The city maintains a website solely dedicated to its urban forestry program, where details of the program can be publicly accessed. Available information includes the urban forestry master plan and annual street tree planting and pruning schedules, currently extending through the year 2021. The site is accessible at ww.santamonicatrees.com.

Every tree in Santa Monica is inspected at least once a year, at a minimum using a "level one" drive-by method done in-house by certified tree risk assessors and certified arborists. The pruning cycle varies depending on species as stated in the guidelines of the master plan. Members of the public can find resources such as tree planting and tree care guidelines, forms to appeal tree removals or file complaints on the website. The city responds to tree-related emergencies within one hour. Liabilities are handled by the city's risk management team, using data and the assessment of the urban forestry division. Santa Monica collaborates on different urban forestry-related research projects such as the urban tree canopy studies with the US Forest Service and UC Davis. It uses its membership to Tree City USA and the accreditations by the APWA as external validation of the program and to learn best practices. Santa Monica's urban tree database is hosted and maintained by its contractor, West Coast Arborists, which serves as an inventory and database contractor for multiple Southern California cities.

As a smaller-population but higher-income city, Santa Monica offers an exemplary model for similar cities in Los Angeles County.

Santa Monica's urban forestry staff includes: an urban forester; two forestry supervisors; three main crew staff responsible for 20 percent of tree removal, 20 percent of tree planting and mature tree preservation emergencies; and an administrative assistant. The city also uses contractors for database maintenance, 80 percent tree planting, 80 percent tree removal, 100 percent of young tree care (under two years), after-hours emergencies and out-of-schedule pruning.

LOS ANGELES COUNTY

Los Angeles County's urban forestry program is divided into four maintenance districts, located in the four "corners" of the county: Palmdale, Baldwin Park, Westchester and in Southeast County. Each has an office and staff. The forestry program's main office is located in Alhambra. The bulk of the program's funding comes from a gas tax, but they are highly encouraged to seek external funding, such as state funding through CAL FIRE. The forestry program has 30 field crew members, split among the maintenance districts, working on urban forestry both in urban and suburban areas of the county. Crews are also responsible for other tasks like infrastructure maintenance.

In addition to fields crews, each maintenance district has an office staffed with: a superintendent; two to three supervisors; and an assistant who works on outreach and administrative and clerical tasks. The County has a tree committee that includes members from multiple departments such as the Deparment of Public Health and the Fire Department. The committee allows for collaboration, data and information sharing, and contributing to studies and programs conducted by various stakeholders.

Field crews focus on ad-hoc maintenance and planting, 10 percent of the pruning and trimming, and responding to service requests by the members of the public. The other 90 percent of work is done by contractors hired through a public contracting process. The County's urban forestry service is working to add regular maintenance and planting to the program. Since most tree nurseries that the County sources its trees from are currently distant from planting locations, the County's urban forestry program staff are working in partnership with the Sheriff's Department and other entities to establish closer tree nurseries. This will ultimately allow them to respond to planting requests more quickly. The County's urban forestry division is also internally developing a GIS tree database that will be publicly accessible once completed. The database is expected to increase efficiency and transparency in working with contractors, and also improve communication and transparency of activities. As of the writing of this report, 35 percent of trees are included in the database. In the next phase, LA County staff plan to hire a contractor to grow the database and inventory potential planting sites.

The County conducts community engagement through local NGOs that work directly with communities on urban forestry activities. Liability related to urban trees is managed by the County's risk management team in consultation with the forestry division on a case-by-case basis. The forestry program takes a proactive approach to avoid liabilities by monitoring and, where possible, addressing issues before they become a liability. Plans for the program include hiring consultants to develop an urban forestry management plan through a multi-stakeholder consultation process. Staff are also open to obtaining accreditation from outside agencies, participating in urban forestry membership programs and working with research institutions that may wish to use their data. Every tree in the County's unincorporated areas is inspected every three years, and trimming is on a three- to six-year cycle for trees and every two years for palms.

CHALLENGES

Many of the surveyed cities reported a lack of funding or budget constraints as the main challenge to urban forestry activities. Even some of the 15 cities that reported having budgets that cover their urban forestry activities with different levels of adequacy expressed concerns about funding. Eleven cities reported having inadequate budgets for urban forestry. Comments submitted with the survey indicated that cities that reported insufficient budgets still do their best to allocate scarce resources to forestry, even if reaching adequate fuding levels is out of reach. For example, a representative from Gardena's department of Recreation, Human Services, Parks & Facilities made the following comment:

> "The City of Gardena allocates $75,000 annually for our tree trimming contract. While this is not a technically sufficient amount, we understand that there is only so much funding available for all departments in the city and that many cities do not fund any contracts."

Concerns also exist around budgets not keeping up with job market trends. A respondent from the city of South Gate's Public Works Department commented that "Minimum wage [increase] has driven tree maintenance cost to record levels." Some cities are working to address this funding issue. For example the respondent from Manhattan Beach said that "the City is currently developing a Street Tree Master Plan which includes budget increases for maintenance and outreach."

Insufficient budgets lead urban forest managers to make hard choices. A respondent from Glendale's Public Works Maintenance Services said, "Forestry receives a general annual budget, [but] funds are not earmarked for specific activities. The result is that tree removals and trimming take priority at the expense of tree planting." This observation is shared by many other urban forestry managers who mentioned that a city's first urban forestry priority is risk management to avoid liability in case of accidents or property damage. With no replacement of removed trees, tree canopy gradually declines.

Urban forestry managers also reported environmental challenges, including California's recent drought, pest infestations and tree disease. A respondent from Rosemead's Public Works Department said that the main challenges are: "Hot valley summers requiring more supplemental water, making establishment much more difficult, and invasive insects." The extra resources required to keep trees alive during a drought affect budgets and decision-making. An aging urban forest where tree succession is not prioritized was an another challenge mentioned by respondents.

Some respondent cities reported struggling to gain community support for urban forestry and getting residents to take up stewardship of existing trees, including watering parkway trees planted in front of their homes. "There are some residents within the city who not only do not care about trees but dislike them," said one respondent. One respondent also pointed to a conflict of interest in some communities, described as "...competition between residents who wish to save all trees and those who wish to remove trees for view and other reasons." In some cases, this discord also exists among city agencies, as one respondent shared: "The Recreation Department - they constantly want to remove a lot of Park trees plus their own lack of educating workers on correct maintenance procedures when it comes to trees and power equipment."

A respondent from one of the two cities who reported not having any urban forestry program said: "Our municipality is land-poor, so we do not have land for urban forestry per se, but we support our local conservation organization that preserves the land surrounding our City through waiving many city fees." This suggests that land scarcity may also be a factor in the lack of urban forestry activities by cities.

Insufficient budgets lead urban forest managers to make hard choices. A city's first urban forestry priority is risk management to avoid liability in case of accidents or property damage. With no replacement of removed trees, tree canopy gradually declines.

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CONCLUSION

The goal of this research was to assess the status of urban forestry programs in Los Angeles County, with a special emphasis on public access to urban forestry resources such as tree inventory databases. To assess these programs, we looked at several indicators including the existence of urban forestry frameworks (e.g., management plans or city tree ordinances), urban forestry budgets, staff with urban forestry-related professional backgrounds, the existence of tree inventories and public accessibility to urban forestry information. Cities were grouped in categories of average household income and population size to assess the correlation between these two factors and urban forestry activities. We refer to a city with a high median income as being a higher-income city and one with a low median income as being lower-income city. For the purposes of our analysis, we created four city categories: smaller-population and higher-income, smaller-population and lower-income, larger-population and higher-income, and larger-population and lower-income.

The survey sample showed that most cities have urban forestry programs performing various activities. Many cities, especially larger ones, have staff with urban forestry backgrounds but supplement staff by hiring private contractors to carry out maintenance activities and maintain the tree databases. Previous studies have favored having routine maintenance done by contractors over performing these duties in-house. A 2012 assessment of the benefits and costs of a comprehensive municipal street tree program found that the use of private contractors was more more efficient and cost-effective for many cities in San Francisco County.[xliii] Using contractors, some cities were able to cut their overall costs by more than half while increasing the level of service; others performed five times the amount of maintenance work done by city staff for the same budget.[xliv] Regardless of whether activities are addressed in-house or through contractors, urban forest management systems can be significant creators of green jobs because they run on mostly human energy to manage, monitor and maintain the urban forest.

The best-performing group in the sample were larger-population and higher-income cities. Smaller-population and higher-income cities and larger-population but lower-income cities were the second best performing groups. Smaller-population and lower-income cities were also lowest-performing. While further studies are needed to confirm whether this trend holds true in Los Angeles County as a whole, these results are congruent with several studies that assessed urban forestry programs in the US.

The research presented in this report also uncovered great variance in the way urban forestry activities are handled by cities, from which departments oversee urban forestry to tree management practices adopted. Many cities' urban forestry activities are handled by public works departments, whereas other cities house urban forestry activities in departments of community services, parks and recreation, or others. Differences in forestry practices include varying trimming guidelines and maintenance schedules, due largely to budget constraints and the adoption of different guidelines and standard. Tree maintenance appeared to be the activity that fluctuates most according to funding availability. As reported by many urban forestry managers, risk management is the first priority for urban foresters, and due to risks of liability, cities often invest more in risk management than comprehensive management. The risks of liability may also deter cities from engaging in urban forestry altogether.

The existence of urban forestry databases and other resources and their availability to the public was not insignificant, and many cities reported hiring contractors who build and maintain urban forestry databases. Several others are currently in the process of developing such resources. Nevertheless, the sample indicated that most cities who have these databases do not make them available to the public. One possible reason is that cost of online databases may be prohibitive in cities already contrained by a lack of urban forestry funding. An online, interactive map with tree data such as TreeMapLA costs in the range of $50,000 to $100,000 annually, which may well be out of reach for many cities and would likely not represent the best investment in a city's urban forest. While there are few open source databases that cities can take advantage of free of charge, their use requires knowledge of Geographic Information Systems (GIS) from urban forestry staff, which not all cities have. Collection of tree data is also time-consuming and expensive and would put a strain on departments which have limited field staff. To address the staffing issue, volunteers could be used in data collection, but when it comes to urban forestry, tree identification requires technical knowledge that is not common to the average person. Therefore forestry data collected through citizen science initiatives cannot be reliable for decision-making by itself. Running volunteer programs also requires management resources that may not be time- and cost-effective in the end, and as shown by TreeMapLA, significant outreach efforts must be made in order for community members to take up data collection on their own.

Cities advertise their urban forestry activities to the public through common channels such as websites, printed materials and public meetings. Some cities have advisory committees comprised of members of the public, city staff, arborists or urban forestry professionals that meet regularly to discuss urban forestry activities. These committees offer a good way to foster transparency and public awareness about urban forestry.

STUDY LIMITATIONS

While we are confident about the representativeness of the sample cities, which account for nearly one-third of cities in Los Angeles County (29.54%), responses from all the 88 cities would clearly have been optimal, as there is much more to learn about urban forestry programs in the cities that did not participate in the survey. The limited responses produced were a result of continued outreach efforts through email and phone communication.

An additional limitation is that the survey was largely qualitative and that survey responses were subjective. The data analysis is thus necessarily based on that subjectivity. For example, a response that the city's budget for urban forestry is sufficient is more likely to be a reflection of the urban forestry manager's perception, their specific targets and objectives, rather than an objective assessment. To have a more accurate assessment of what resources are needed would require more empirical studies, similar to a study conducted by McPherson et al. for the Million Trees LA project, which took into account the state of the existing urban forest and the potential for its expansion.[xlv] This potential subjectivity raises a question of how comparable some of the survey responses across different cities can be, especially when added to the fact that different cities have different urban forestry targets, use different standards and guidelines, and have otherwise differing goals and approaches.

We also noted several cases of inconsistencies, where a respondent would, for example, respond that the city does not have a budget dedicated to urban forestry, while elsewhere in the survey stating that the city has a forester on their staff and does regular maintenance of its street trees. Such an inconsistency suggests that the city does in fact have a budget. Given time constraints and the limited scope of this research, it was not possible to follow up with respondents to clarify. The number of such cases was small and the analysis was not significantly altered as a result.

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RECOMMENDATIONS

CREATE AN URBAN FORESTRY ADVISORY BODY.

In addition to collaboration among cities' internal agencies and departments, several respondent cities have advisory bodies made up of members of the public, city arborists, urban forestry professionals and other stakeholders. Depending on the city, this body may be referred to as an urban forestry task force, a community forestry advisory committee, a tree committee, or go by another name. Regardless of the name, these entities share similar goals: to foster transparency and facilitate communication between city officials and the public about urban forestry, and to discuss and reach consensus on new projects or programs that affect urban trees. Cities also use council meetings, websites, mobile apps, newsletters, social media, newspapers, door hangers, events such as Earth Day or Arbor Day, and other channels for communications. Growing such efforts should be a goal of any city wishing to improve urban forest management.

MAKE THE NECESSARY INVESTMENTS TO MEET REQUIREMENTS FOR AVAILABLE PUBLIC/PRIVATE GRANTS AND OTHER URBAN FORESTRY RESOURCES.

A host of public agencies and private organizations exist which provide municipalities with various resources – from education and training to funding – to support the urban forest. Most of these entities have minimum eligibility requirements or charge membership fees, calling for at least some upfront costs to cities. For example, to qualify for a CAL FIRE urban forestry grant to support tree inventories, cities must have staff with training related to urban forestry and a street tree ordinance. Similarly, to become a member of Tree City USA, a city must maintain a tree board or department, have a community tree ordinance, and spend at least $2 per capita on urban forestry.

Dedicating a budget to meeting these requirements is a good investment. For example, investing in the requirements needed to apply for (and ultimately be successful in obtaining) a CAL FIRE grant allows cities to acquire tree inventories, which serve as the basis of any efficient tree management system. Becoming members of urban forestry programs like Tree City USA gives cities access to a wide network of forestry practitioners, resources and incentives to improve urban forestry programs. Making use of resources such as education, training and outreach materials can help cities address some of the challenges they face in their urban forestry programs, such as gaining community support.

PURSUE PARTNERSHIPS WITH PRIVATE CONTRACTORS TO MAKE TREE DATA PUBLICLY ACCESSIBLE.

In forest management, detailed data on the urban forest are critical to understanding urban forest trends and assist in decision-making.[xlvi] As shown by the survey responses, much more data exist about urban forests of LA County than are publicly available. In many cases, cities have databases that are maintained and hosted by private contractors and are used for internal management purposes. There are also efforts to make data publicly accessible, as shown by the two cities in the sample who maintain open data portals for their tree inventories. The most wide-ranging effort in this regard nevertheless remains TreeMapLA.

Many LA County cities contract urban forest inventory collection to contractor West Coast Arborists. This centralized data location allowed data to be added into TreeMapLA in a relatively straightforward way once a city gave approval for its data to be shared. These efforts allowed the database to become host of tree data from 33 cities, amounting to nearly a million trees throughout LA County, and becoming the largest OpenTreeMap (the broader mapping effort of which TreeMapLA is part) project nationwide. Yet a challenge impeding TreeMapLA's potential for further success is that the tool has a significant cost for operation and maintenance, making the future viability of this tool uncertain.

As such, in order to make cities' existing urban forest inventory data publicly available, cities have the option to build and host their own portals (as respondent cities Santa Monica and Rancho Palos Verdes illustrated) or make data available on external portals. The survey revealed that many cities already have inventories hosted by private contractors, indicating that there is an opportunity for cities and contractors to work together to make them public. To make this work, multiple conditions would have to be in place, including: cities must consent to their tree data being made public; contractors must be willing to release the data; there should be no cost to the contractors to release the data, or in case there is, they must be compensated for incurred costs; and contractors must have the appropriate platforms for public accessibility.

While the feasibility of such a partnership is not certain and needs further assessment, this approach may represent a way to make more urban forest data publicly available fairly quickly and at a relatively low cost.

CREATE AN URBAN FORESTRY MANAGEMENT PLAN.

Ultimately, urban forest research is only be as useful as the plans and implementation frameworks it informs. Therefore, the authors of this report recommend that cities consider creating comprehensive urban forestry management plans that outline goals, policies, funding and management practices in support of a robust urban forest. Such a plan would include a tree canopy target, protocols for urban forest management, an up-to-date tree inventory, avenues to obtain adequate funding, a progressive timeline and community engagement around urban forest stewardship.

APPENDIX A: URBAN FOREST MANAGEMENT SURVEY

This survey is being conducted by TreePeople, an environmental nonprofit organization based in Los Angeles that focuses on making the urban environment safer, enjoyable and sustainable. TreePeople does this by inspiring citizens to care more about their environment and providing policy makers with the science they need to make environmentally-sound policies. You can find more about the organization by visiting our website: www.treepeople.org.

This survey seeks to identify urban forestry activities of a representative sample of municipalities in Los Angeles County, and to assess their status, scope, challenges and opportunities. The answers you provide will inform a report on municipal agencies' and public interest organizations' urban forestry activities. If you would prefer your responses be published anonymously, please check here.

This survey has two sections.

Section A: Jurisdiction's urban forestry activities

This section explores all urban forestry activities in the municipality, their status, actors involved and their accessibility to the public

1. Your information
   a. City or organization you represent: _____
   b. Department you represent: _____
   c. Your name (optional): _____

2. Is your municipality/organization involved in activities related to urban forestry? (Y/N)

3. What urban forestry related activities is your municipality/organization involved in? Circle one or more options below:
   a. Tree planting
   b. Tree care or maintenance
      If yes, is there a regular schedule for maintenance? How frequent?
   c. Community based urban forestry
   d. Environmental restoration
   e. Environmental research/education
   f. None of the above
   g. Other (please fill in):_____

4. Which departments or divisions are involved in urban forestry activities in your municipality/ organization? _____
    a. Do departments within your municipality or organization work collaboratively with other departments or partners, either informally or through committees? (Y/N)
        If YES, please describe. _____
    b. Does your department have any staff with a related professional background or training? (Y/N)
        If YES, please describe that background or training. _____

5. Is information made public about the urban forestry activities provided by your municipality or organization? _____
    If so, how does your municipality or organization make information public about those activities? _____

6. Does your municipality/organization have a framework for urban forestry activities? (e.g., policies or city ordinances, urban forestry master plan, tree planting guidelines, etc.) (Y/N)
    a. If yes, what are the titles of the documents and when were they adopted? Please provide links if documents are accessible online. _____
    b. Who was involved in the process of developing these documents? _____
    c. How often are these documents updated? _____

7. Does your municipality or organization have a tree inventory? (Y/N)
    a. Is it a street tree inventory? Parks inventory? Institutional land use (e.g., school campus) inventory? _____
    b. When was it last updated? _____
    c. How regularly is it updated? _____
    d. What tree details are recorded in the database? _____
    e. What system or protocol is used for data collection? _____
    f. What system or protocol is used for data storage? _____
    g. Who collects data and updates the database? _____
    h. Is the database publicly accessible? If so, how? _____
    i. How is the database used, and by whom? _____
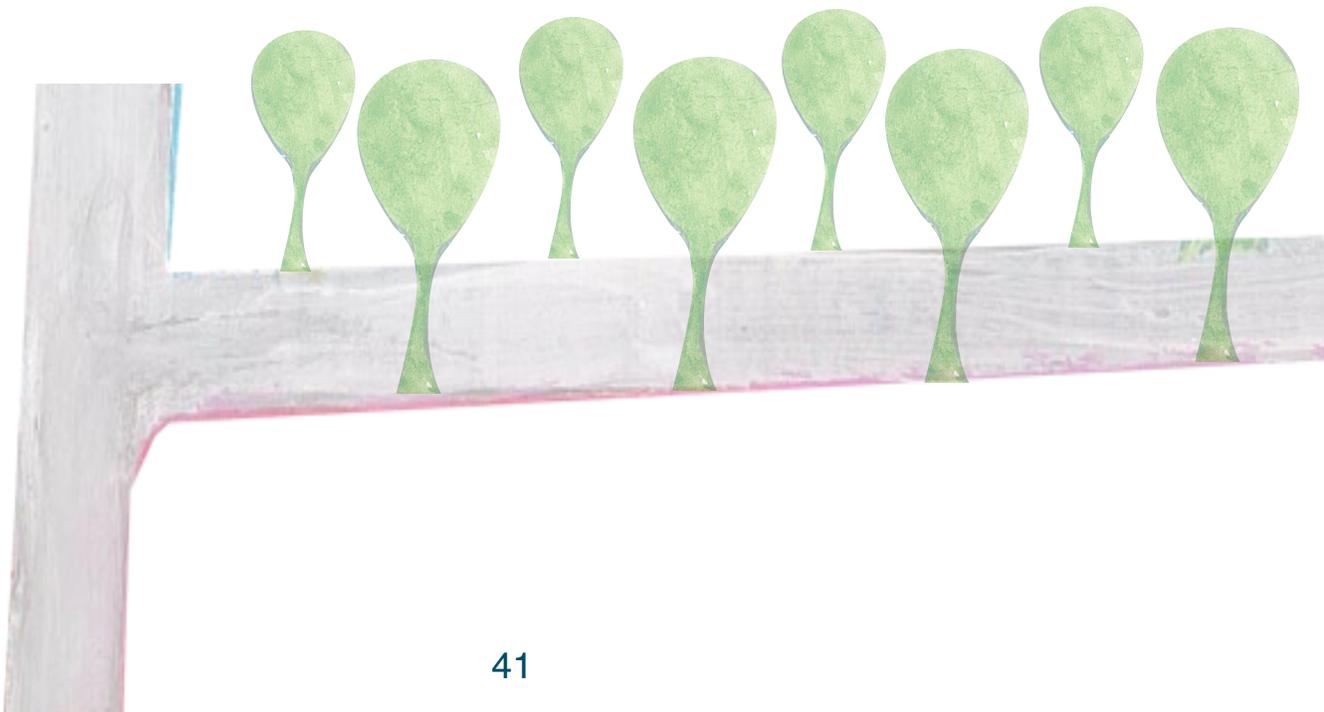
Section B: Opportunities and challenges of urban forest management

1. Does your municipality/organization have a budget for urban forestry activities? (Y/N)
   If yes please answer the following two sub-questions (a & b)
   a. The budget adequately covers the urban forestry needs of your community (circle one)
      i. Strongly disagree
      ii. Disagree
      iii. Neither agree nor disagree
      iv. Agree
      v. Strongly agree
   b. The public supports the budget allocated to urban forestry activities (circle one)
      i. Strongly disagree
      ii. Disagree
      iii. Neither agree nor disagree
      iv. Agree
      v. Strongly agree
   c. Comment (optional): _____

2. Is your municipality or organization involved in some multi-city/large scale urban forestry initiatives? If yes, please list (e.g., Arbor Day Foundation, Alliance for Community Trees, Tree City USA, National Urban and Community Forestry Advisory Council, California ReLeaf, etc.)

3. What other resources are available to support urban forestry efforts in your municipality/ organization? Are any of these resources publicly available? Please describe.

4. Are there any challenges your municipality/organization faces in conducting urban forestry activities? If so, please describe. _____

5. What resources are needed to address these challenges? Please describe. _____

6. Do you have any other comments you would like to share? _____

APPENDIX B: SUMMARY OF CITIES' RESPONSES

City	Department responsible for Urban Forestry	Street tree inventories Y/N	Data collected (Variables in bold characters are the ones recommended by the Urban Tree Growth & Longevity (UTGL) Working Group for a basic inventory)	Publicly accessible Y/N	Budget Y/N
Alhambra	Public Works	Y	Maintenance, **Tree Species**, **Size**, **Location**, Recommended Species	N	Y
Artesia	Parks & Recreation	N	-	-	-
Avalon	Public Works	N	-	-	-
Bell Gardens	Public Works	Y		N	Y
Claremont	Community Services	Y	**Diameter at Breast Height (DBH)**, Height, Width, **Location**, **Condition**, Constraints	N	Y
Gardena	Recreation, Human Services, Parks & Facilities	Y	**Size**, **Condition**, **Location**, **Species**, Work Detail	N	Y
Glendale	Public Works Maintenance Services	Y	**Location**, **Species**, Tree Size (**Diameter** and Height), **Tree condition**, Presence of Utilities, Parkway Size, Recommended Maintenance, Work History, Estimated Value, and 'Priority'	N	Y
Hermosa Beach	City Manager (?)	N	-	-	Y
Lakewood	Trees (?)	Y	**Location**, **Species**, Height, **DBH**, Spread, **Condition**, Latest Trimming, Trim Cycle, and Work Orders.	N	Y
Los Angeles City	Office of the Mayor	Y	Date of Maintenance, History and **Condition of Tree**	N	Y
Los Angeles County	Public Works	Y	**Species**, **DBH**, etc.	N	Y
Manhattan Beach	Public Works	Y	**Location**, **Size**, **Tree Species**, **General Health**, Last Trim Date	N	N

City	Department responsible for UF	Street tree inventories Y/N	Data collected (Variables in bold characters are the ones recommended by the Urban Tree Growth & Longevity (UTGL) Working Group for a basic inventory)	Publicly accessible ? Y/N	Budget Y/N
Norwalk	Public Services	Y	**Tree Species**, Address, **Site Location**, **GIS Coordinates**, Maintenance Category, Maintenance Records.	N	Y
Pasadena	Public Works - Parks and Natural Resources Division	Y	**Location**, **Tree Species**, Height, **DBH**, **Condition**, Parkway Size, Maintenance/ Work History, Estimated Value, City District	N	Y
Pomona	Public Works Department, Parks Division	Y	**Site Details**, District, Address, **Location**, **Species**, **DBH**, DBH (in), Height, Maintenance, Condition, Est. Value, Utility, **PSHB/borers**, Comments, Priority, Valid, PW Type, Parkway, Border Tree	N	Y
Rancho Palos Verdes	Public Works	Y	Size, **Health**, **Species**, History Of Maintenance And Any Problems That It May Have Had, And Worth Of The Tree	Y	Y
Rosemead	Public Works	Y	Last time trimmed, **DBH**, **Tree Characteristics**	N	Y
San Dimas	Parks and Recreation	Y	**All standard urban forestry metrics on trees and work performed**	N	Y
Santa Monica	Public Works Department	Y	**Location**, Height And **DBH** Range, Estimated Value, **Concerns** And Work History	Y	Y
Signal Hill	Maintenance Operations	Y	Yes	N	Y
South El Monte	Field services	Y	Tree Species Last Trimmed Health	N	N
South Gate	Public Works	Y	Address, **Tree Species**, **DBH**, Height, **Location**, District Number, Recommendations, Work History, Estimated Value, Recommendations For Planting, GPS Coordinates	N	Y
South Pasadena	Public Works	Y	Address, Tree Species, DBH, Height, Location, District Number, Recommendations, Work History, Estimated Value, Recommendations For Planting, GPS Coordinates	N	Y
Anonymous	Public Works	Y	**Location**, **Size**, **Tree Species**, **General Health**, Last Trim Date	N	Y

APPENDIX C: REPORTED MAINTENANCE CYCLES

3 months: La Mirada (Quarterly Grid Trimming and on-call maintenance and removal)

1 year: Bell Gardens, Manhattan Beach

2 years: Signal Hill, LA County: 2 years for palm trees, 3 to 6 other trees depending on growth

3 years: Norwalk, Rancho Palos Verdes, Rosemead, South Gate, Santa Monica: tree pruning cycles of 1, 2, 3 or 5 years depending on species and location

4 years: Alhambra, Lakewood, San Dimas, South Pasadena

5 years: Gardena, Glendale, Pomona

7 years: Claremont, Anonymous

20-30 years: LA City

Pasadena: species-based and based on ISA best management practices

South El Monte: species based

Hermosa beach: depending on size

APPENDIX D: RESPONDENT PUBLIC INTEREST ORGANIZATIONS

Organization	Website
Canoga Park Neighborhood Council	https://www.canogaparknc.org/
The Eagle Rock Association	http://tera90041.org/
Eagle Rock Neighborhood Council	http://www.wordpress.eaglerockcouncil.org/
EcoKai Environmental	http://www.ecokai.com/
Industrial District Green	http://www.industrialdistrictgreen.org/
Social Justice Learning Institute	http://www.sjli.org/
South Robertson Neighborhoods Council	http://www.soronc.org/
Anonymous Botanic Garden	

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